PERSONAL
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Superstar game for First Division football

THE HARD FACTS . . .
. . . on micros that made the news in '83

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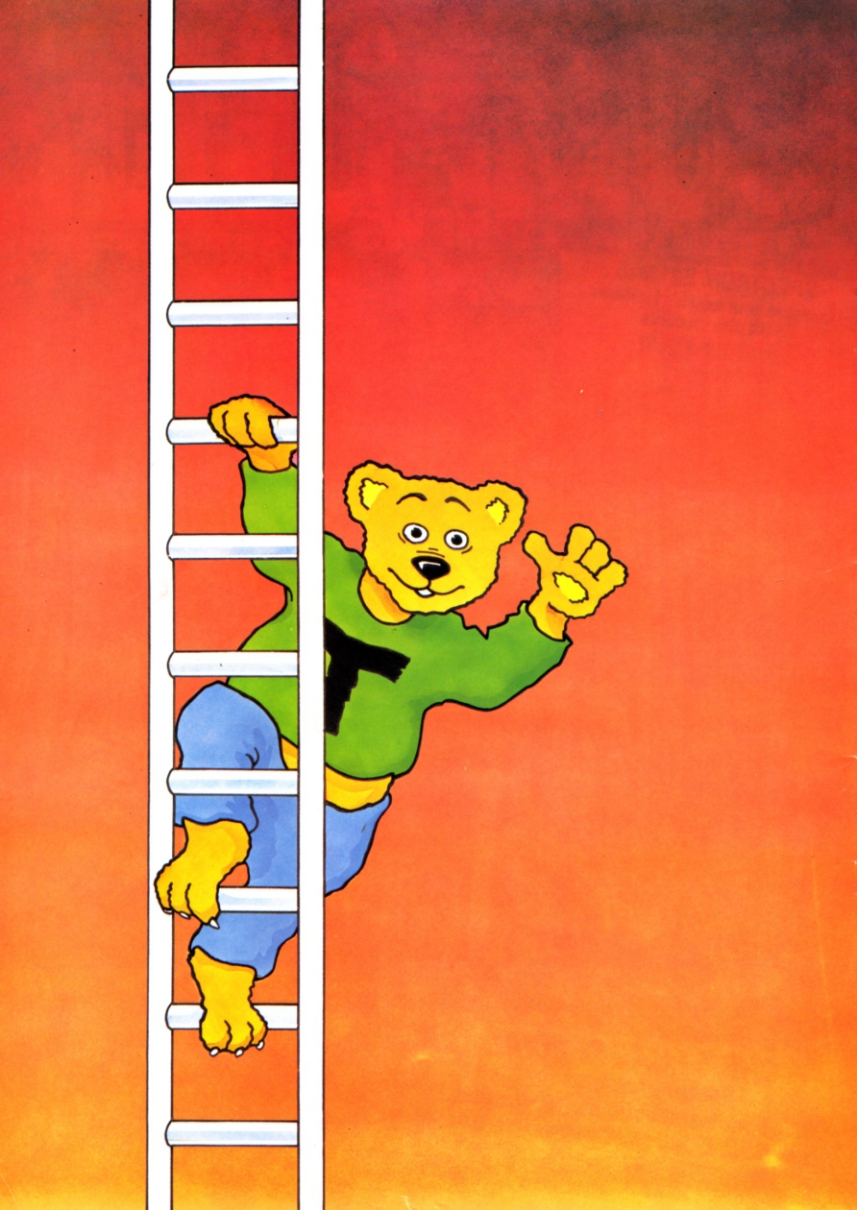
CHRISTMAS SPECIAL
Games programs for the ZX81, Spectrum, Oric, Vic20, Dragon, Atari, BBC, Electron, Commodore 64

Free poster inside!



FREE PROGRAMS

Pull-out and keep
Micropaedia

Our Christmas special with games for the ZX81, Spectrum, Oric, Vic 20, Commodore 64, Atari, Electron, BBC and Dragon. PLUS . . . pull-out colour poster!

REGULARS

Cover illustration by Kevin Faeber.

This week our pull-out Micropaedia is packed with games programs for you to type in over the Christmas period. You'll have extra time to enjoy them because PCN won't be published next week — No. 43 will be on sale on January 5. Have fun . . . and Happy Christmas from all at PCN.

PCN HARDWARE

PCN SPECIALS

PCN PRO-TEST: PERIPHERALS

PCN PRO-TEST: SOFTWARE

GAMEPLAY

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Acornsoft gets tough

By David Guest

Acorn has outlawed tape-to-disk copying of its software — despite having made no objection to the Advanced User's Guide which shows you how to do it.

Apart from this volume, there are commercially available programs to perform the transfer, and routines circulating through the BBC user groups. But Acorn last week won an injunction against the monthly magazine *Personal Computer World* to prevent circulation of its latest issue, which contained a routine to move software from a cassette on to a disk.

Acorn and PCW's publisher later settled out of court and the issue of the magazine goes ahead — but the repercussions from the action are likely to spread.

Acornsoft's complaint was that PCW incited its readers to break the protection of its software. A spokesman said: 'The right to an effective copyright is enshrined in the law — the right to copy from tape to disk isn't.' He confirmed that Acornsoft won £65,000 from the settlement.

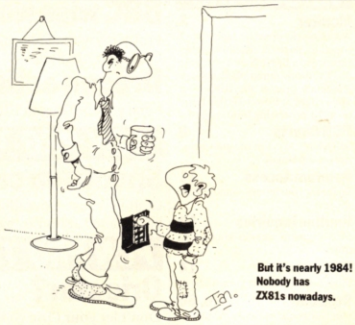
Since the matter was settled out of court no legal precedent was set, but Acorn regards it as a test case.

This has left the suppliers of tape-to-disk routines feeling very exposed. One said this week: 'I feel software producers are now very vulnerable. Acorn has been threatening to take action for some time.' But he added: 'We'll keep on selling.'

Acornsoft intends to rewrite its lock to invalidate all existing routines, and to offer a service to let you upgrade software from cassette to disk at half the cost of the disk-based software. But a representative of a BBC user group said that users were only likely to use the service 'if Acorn suddenly changes its delivery structure'.

A cuckoo in the nest? PCW on sale last week at Acorn's London shop . . .

SCREEN TEST — Emco has launched a colour monitor, the Luxor, as an alternative to IBM's PC monitor. It has a 14in screen, anti-glare glass, a high resolution of 820 × 640 and is surrounded by a tough metal case. With a simple chip change, the monitor is compatible with most micros. It will be sold through IBM dealers at a price of £540. Further information from Emco (01-737 3333).



But it's nearly 1984! Nobody has ZX81s nowadays.

Christmas present from Prestel

Prestel is giving a Christmas present — from 6pm on Friday December 23 to 8am on Tuesday January 3 all calls to Prestel will be charged at the cheap off-peak rate.

From 1pm on Saturday December 24 to 8am on Wednesday December 28 and from 1pm on Saturday December 31 to 8am on Tuesday January 3 there will be no charge for using Prestel apart from the cost of the telephone call.

Prestel offered users a similar Christmas bonus last year but there was an outcry from home users when it failed to do the same thing over the Easter weekend. It was only after complaints from computer clubs and lobbying by *PCN* that Prestel agreed to review its charging policy for bank holiday weekends.

Parents get in on act

By Geof Wheelwright

The microparents are coming.

They are a new species of parent, not too distantly related to the once-abundant stageparents — who kept the careers of many child actors going when they might otherwise have flagged.

Microparents dutifully ring up software houses when their child's program has been collecting dust in some managing director's in-tray for six months and write letters to the patent office or the Ministry of Trade to ensure it's going to be properly copyrighted.

And software houses say the role of these parents is becoming increasingly important. But they agree that parents tend to encourage children to send in programs only a mother could love.

Mike Fitzgerald, the managing director of A&F Software, said that '99 per cent of programs we get in aren't up to standard' and that 'lots of parents are naive about micros when they see something a child's done'. He said that because many parents know far less about micros than their kids, they tend to be impressed far more easily by commonplace graphics and sound.

Quicksilva software manager Paul Cooper says that most programs he receives also aren't up to scratch. But he adds, however, that when a good program does come in the parents of the child that produced it play a vital role.

He says that once he's accepted a program, the company tries to call a meeting with the family. 'Things can get quite difficult: the youngest member of the family will be the person bringing in the most money. We set up advice on investing money and handling problems, as well as setting up trusts,' said Mr Cooper.

He said parents often come along and negotiate for their children. 'It's better for us because the parents have a better idea of how to deal with money than the kids — they are a lot more shrewd.'

Shrewdness is essential with big money at stake.

A&F's Mr Fitzgerald says that he pays royalty rates depending on how good programs are, with standard royalty rate of 10 per cent. A&F's current best-selling program has sold 20,000 copies in five weeks and the programmer who wrote it will gross 15 per cent on sale prices less VAT — an average of 44p per copy. You don't need a program to value that.

Survival course

'The Aquarius is to survive' is the battle cry of Radifon for 1984.

Radifon, the company which takes over UK distribution of the ex-Mattel Aquarius in the New Year, has high hopes for the machine. And it seems that plans outlined by Alan Leboff, Radifon's managing director, in October (Issue 34) are beginning to take shape.

The first ten games packages should be in shops this week. These will include: Chuck Man, N-Vaders, Aliens and Grid-bug and will cost £6.95 each.

Although the Aquarius is considered a home computer supported by games software, a word processor and a household package, Radifon sees it mroe as an educational aid.

'Logo is the best computer language for children,' said Mr Leboff, 'and we see it as being an important feature of the Aquarius.'

Radifon expects its 32K RAM pack to be available at the end of January and a four-colour printer in February.

There are plans for an Aquarius II in the middle of next year, offering extended Basic, a larger memory and full-travel keyboard.

Price cuts on Aquarius add-ons and software will be offered to members of the user group set up by Radifon.

Further information about the Aquarius user group is available from: Radifon, Hyde House, The Hyde, London NW9 6LG.

Hawke ready for Occam

Act now and you could steal a march on almost everybody!

Hawke Electronics (01-979 7799) is already planning for the introduction of Inmos' Transputer, due to be available at the end of next year. It is selling an evaluation kit to give potential users the chance of familiarising themselves with Occam, the language it will run.

The kit costs £175; it includes a compiler, an editor, and tutorial examples. And if the Transputer doesn't make it, you can always use it on an Apple II.

Incredible Hulk plays it down

The incredible Hulk took on the might of the BBC and Torch micros last week.

Hulk is an expert system, written in Basic by Richard Forsyth, a senior lecturer at North London Polytechnic. It will sell for £25 from Brainstorm Computer Solutions, 01-263 6926.

At the lowest-key launch on record the product was described in far-from glowing terms: 'This simple package . . .', began one sentence. Derived from a program he devised earlier, Mr Forsyth says that for the Hulk he '. . . decided to cut out the complicated bits . . .' and 'Surprisingly perhaps, it works quite well.'

It will be supplied with a sample program to allow you to classify coal samples — something no serious micro user should ever find himself without.

More seriously, Hulk brings an aspect of artificial intelligence engineering well within the range of the enthusiast.

SIX ZEROS — Would you buy a home computer from this man? A silly question really, since you already have, in enormous numbers. Following in the footsteps of the ZX81, the one millionth ZX Spectrum has rolled off the production line. To mark the occasion Sir Clive Sinclair was presented with a custom-built model, thought to be the only albino Spectrum in existence. The micro was launched in April 1982 and this Christmas has made a healthy start on its second million.

More than meets the eye . . .

PRINT RUN — If you're looking for a printer to get your thank you letters in order, Able Systems, 0606 48621, might help. At £113.85 the Able printer 40 is a 40-column printer, using red or black ink ribbon producing 65 characters per second. With a Centronics interface a 96-character ASCII set is produced on a 7×5 or 7×10 dot matrix and it can be used with most home computers.

Keep tabs on your rights

In the last-minute rush to find a micro for Christmas don't forget to check the guarantees offered.

As explained by the Office of Fair Trading, buyers have rights. The computer you buy should be 'fit for the purpose' and appear 'as described'. If it goes wrong and if you can prove the manufacturer is at fault, the retailer is obliged to refund your money or, if you prefer, offer you a replacement.

It should be easy to show the equipment has a manufacturing fault a few days after purchase, but as the weeks go by the chance of doing this diminishes.

As a bonus, most manufacturers offer at least one year's guarantee, though the terms of this vary.

Commodore's guarantee period starts from when the new machine reaches the customer. Should a machine go wrong and be returned, the company will try to repair it. Should the same fault recur the support will continue even after the year is ended. And if the fault can't be repaired Commodore will replace the machine with a new one — a new computer means a new guarantee.

Sinclair has a different approach. It states that the year's guarantee begins at the date of the first purchase. The company offers a replacement immediately it receives the faulty computer, so giving more chance of a quick turn around.

However, the computer returned to you may not be the original one and could be second hand. This should not be a problem as long as quality control is consistent, but should you discover the computer you possess is not yours and you want your original back, you are within your rights to insist on having it.

VIEW FROM AMERICA

Panic buying sparks US micro boom

By Chris Rowley

'Tis Christmas at last and a hush has fallen across the rather stunned American retail landscape. Americans came back to Christmas this year with a roar of wallet zippers and credit cards clacking across counter tops. Never had so much been spent so fast, the figures evoked comparison to the US defence budget! At the heart of the boom was the gift of the season, the micro. By some estimates as many as 2 to 2.5 million micros have just been purchased. Every model has been selling heavily. In fact there were strange scenes. The distress sale price of $50 for a TI99/4A turned the machine into a 'stocking stuffer' and provoked near riots like the battle at the Greensboro North Carolina K-Mart, where hundreds of shoppers stormed the door and fought for the machines on display. The store had to be closed while the computer crazed Carolinans were dispersed by police and state troopers.

But every available machine was selling. The consensus of analysts was that Coleco missed out on a huge number of sales by failing to get more than 150,000 machines into the shops. Equally agonising for Atari were production cutbacks in the summer of red ink, leaving shortages of everything. I doubt seriously that there is an unsold Atari XL anywhere in the New York region.

Who really did well? Yep, that's right, over at Commodore they were so busy refilling Santa's sleigh that nobody could come to the phone, but it is believed that as many as 500,000 64s and Vic 20s have been sold in the past few weeks.

One result of all this is that as much as 15 per cent of Coleco's entire stock is now in a short position, with investors borrowing shares to sell at today's price in anticipation of buying much cheaper shares really soon when prices fall dramatically. Of course, Coleco does have $25 million rolling in from the Cabbage Patch with which to keep the banks at bay for a while, and just possibly sales of Adam will keep building through January to confound the speculators.

Right on cue, in the midst of the biggest microsale boom yet seen, came the Comdex extravaganza in Las Vegas. In four short years Comdex has ballooned into the biggest vein in US trade shows. Certainly it strains Las Vegas' capabilities as host city to the limits. This year 83,000 visitors trudged the 11 miles of aisles to gaze upon the 1,400 exhibits (550 new to the show) which had around $100 million worth of equipment on display. But while they babbled new buzz words, bewildered visitors battled in the bizzare conditions which meant 50 minutes' wait for cabs, for restaurant tables, even for phones. It was worse than Disneyworld on July 4 weekend and much more expensive per head. Along the aisles Elvis Presley and Marilyn Monroe clones meet the crowd along with hustlers of every shape and hue. There wasn't a hotel room to be found within 100 miles and the take for Las Vegas itself was in the region of $150 million.

Now that Comdex has become such a colossus clear trends could not be discerned except for a vast proliferation of software offerings. Possibly next year's show will be a little smaller once the 'Great Software Shakeout' has taken place. There are now enough accounting and tax preparation packages to stretch from here to the Salyut space station if not to the moon.

The quote of the show came from its organiser, Sheldon Adelson of Interface Group (said to have netted $13 million from this year's show)... 'If there's a trend at the show it's the selling of total solutions to the computer illiterate business community.'

The Comdex daily newspaper (200 pages) even spawned a spoof aptly christened 'Confuserworld' — sample headline 'IBM calls it quits — just no fun anymore . . .'

Hardware News: — run CP/M software on your Commodore 64 with the Convert 80 Interface card ($350) and 5¼in disk drive ($500) from Estes Engineering of Kansas. This means a CP/M Commodore 64 system with two drives, colour monitor and printer can be assembled for about $2,200.

ITV plan dies

Plans for an ITV micro have been strangled at birth.

Although the prospects for the machine looked favourable, the Independent Television Companies Association (ITCA) has killed the project on the grounds that it would probably have contravened the Broadcasting Act, and that it would have led to a conflict of interest with advertisers.

The idea of an ITV micro (Issue 41) had initially found favour among the independents because it would allow computer awareness programs to be centred on one machine, and the project had progressed far enough for preliminary specifications to be sent to manufacturers.

Rumour had it that the most likely candidate for the ITV micro would be one based on the machine being produced by Prism Microproducts and Transam for a January launch, but Transam won't talk about the machine, and Prism's Bob Denton flatly denies any connection with the ITV machine. In any event the future of the Prism/Transam does not seem to hinge on the ITV project.

But where does that leave the independent TV companies? The best way to run a computer education course, or series of courses, is clearly to centre it on one micro. But even with no ITV micro, structuring programs around, say, the Commodore 64 would land the independents in the sort of mess from which they've just stepped back.

So ITV programming, because of the very nature of ITV companies, cannot really be centrally co-ordinated. Different ITV companies will therefore be using different micros.

Koala paints by numbers — but is it art?

Koala Painter: quick on the draw.

Koalas look cuddly but if you describe them properly as a kind of tailless sloth they don't sound too attractive.

That shouldn't worry Audiogenic. Its Koala Painter graphics tablet looks attractive enough on the basis of price. The tablet with stylus, software and instructions cost £89.95. It connects with the Commodore 64. Budding artists gets a menu divided into three sections — commands, brushes (different thicknesses are available) and the colour palette. You can add to your free-hand designs with the system's own facilities, which include lines, frames, boxes, rays and circles.

The unit weighs 1lb and is small enough to hold in your hand. Avant garde artists should note that you can draw on it with your finger.

Audiogenic is on 0754 595647.

Bedford in the van of bid to set up BBC network group

A user group for BBC networkers is being set up by a pair of Econet users with a familiar complaint — they're waiting for Level 2.

The group is planned by Tom Short and Mike Taylor of Bedford College of Higher Education (0234 45151). Mr Taylor said: "We hope to get going in the new year,' but he added that plans were at a very early stage, and that details, like subscriptions, had not been finalised.

The college runs an Econet system with 25 BBCs, but the user group will encompass any networking system that uses BBC micros — this could include the Cambridge Ring or one based on a version of Unix.

Acorn's interest in the Cambridge Ring (Issue 39) may spell the end of Econet, and its involvement with Logica and Microsoft points to another development around Xenix, Microsoft's version of Unix.

The aims of the group, if it gets off the ground, are not unusual — to pool expertise and to act as a pressure group on the manufacturer. If Acorn drops Econet, the first of these could be important to current users; if it develops the other options with the same lagardliness as it has shown with Econet, the second could be vital.

Acorn, according to Messrs Short and Taylor, is pleased with the idea and has undertaken to give advice and to make staff available to address meetings.

Anybody interested in the group should contact Tom Short or Mike Taylor at the Computer Centre, Bedford College of Higher Education, (Mander) Cauldwell Street, Bedford MK42 9AH.

BBC Showboat

By Wendie Pearson

The BBC Micro User show turned out to be something of an Aladdin's Cave for the 50,000 people who crowded in over the four days.

New software and peripherals for the BBC were there in abundance but for the Electron there was some software and plenty of plans.

Acorn was showing its Z80 second processor, which will bring CP/M to the BBC, improve processing speed, and add to its memory. It will cost about £400 and you'll have to wait until March. But you don't have to wait for Acorn. It appears to have been beaten to the Z80 by independent supplier Watford Electronics.

Watford was showing a Z80A board for the BBC costing £345 and due at the end of January. The processor runs at 4MHz and the board holds 64K of RAM, a 4K monitor ROM, and a double density disk drive interface for the BBC micro.

Assembly language programmers may have been disappointed to find System Software sold out of its latest product. Known as ADE, it costs £60 and is a complete program development package.

This 16K ROM contains a full 6502, 2-pass Macro assembler, front panel debugging monitor, disassembler and text editor/word processor.

Micropower launched 13 new machine code games — and all but one will work on the Electron. Available through dealers, they cost between £6.95 and £7.95 and titles include Bumble Bee, Hell-driver and Wizard's Challenge.

GSL released a Winchester disk system for the BBC giving up to 280Mb of storage. One 10Mb disk costs £2,242.50 and is designed to work with Econet. GSL has also produced a 64K print buffer, an analogue signal analyser which converts the BBC into a two-channel storage oscilloscope, and a real time clock, as well as customising the BBC itself in a wooden casing.

Pace Disc Systems has brought out two Eproms for £34 each. Toolstar is described as a toolkit ROM which will reduce program development time; Commstar is a ROM-based intelligent communications facility, allowing communication with other computer users, Prestel, and other databases.

U-Micro cards in IBM hand

U-Microcomputers, well-known for its Apple motherboard and add-ons, has jumped on the IBM PC bandwagon with two new cards.

For £286.35 you can slip in the IBM Business Card to give 64K RAM expandable to 256K, serial interface, Centronics interface and a clock/calendar. For laboratories there's the IBM Science Card at £465.75. This one includes an eight channel 12-bit A/D converter.

A spokesman for U-Micro said: 'The IBM PC is selling very well, so it's inevitable we should produce add-on cards for it. These new cards will increase the PC's capabilities and they should also run on IBM compatible machines. The Apple is rather an old machine now.'

Both cards are available through IBM dealers or U-Microcomputers. 0925 54117.

Round micros get hard disk

ABS Computers, producer of the year's most adventurous micro where style is concerned, has given its globular Orb system a hard disk.

The 10Mb integral disk drive can be incorporated into the Orb's processor unit in the form of a half-height (1¾in) box — the basic twin floppy system can also be upgraded with 10Mb and 20Mb add-on units.

The integral disk unit costs £2,000; the add-on drives are £2,500 and £3,000 respectively.

The Orb was launched in June and caused a stir with its unusual design. ABS has designed the hard disk add-ons to match the original.

Speed record

Gallium arsenide is one of those technologies where the experts will still try to blind you with science. But don't let them fool you — it's all perfectly simple.

Here's the *Financial Times*' explanation of how a gallium arsenide substrate makes things happen.

So now you know. It's all due to microscopic electricians hurling around the chip at something close to the speed of light.

economically produce the material. "Silicon and gallium arsenide will both be with us forever," said Bass.

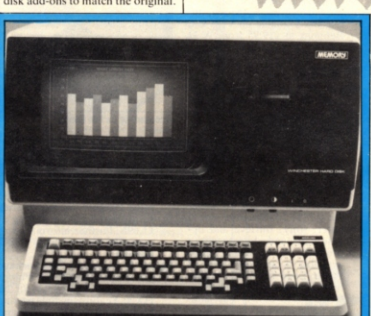
In gallitum arsenide, electricians can move about more easily and reach higher velocities, allowing an electronic switch that can operate more quickly, giving faster computers. In addition, microwave

Colour print on the cheap for PC users

A colour printer costing less than £600 should be available for IBM PC users within six months.

The printer is Integrex's Colourjet, a seven-colour ink-jet device that runs off the BBC micro. It costs £574. For another £165 you can add a viewdata interface incorporating a serial interface to supplement the Centronics one supplied with the standard model.

An Integrex spokesman wouldn't give a firm release date for the IBM version of the Colourjet, but confirmed it would be within six months.



HARD MEMORY — The Memory 8000 series of micros features the normal Z80, 64K small business personal micro environment with an added attraction to make them stand out in the crowd. The operating system is a CP/M-compatible multi-user, multi-tasker called Bridos. Dealer prices for the twin 400K floppy version are £1,500 and the Winchester model, with 800K on a floppy, starts at £3,400 — volume discounts apply but note that these are dealer prices.

Nickel shield guards systems

Bugged by CB or other interference? Then you need a nickel-based paint to put on the inside of your micro's casing.

In an impressive TV demonstration a CB radio was passed less than 1ft above two micros, one standard model and one treated with the paint. The unprotected machine crashed, but the other carried on without a flicker.

The paint, a British product known as R65 or Isolex, shields the micro from radio and magnetic waves.

The laws overseas stipulate that export computers have to be screened or shielded and some manufacturers are already using this paint. But there's no requirement for the UK to follow suit, although with America, Germany and Japan demanding shielding on import machines, Britain may have to follow.

But it's not a DIY job — by opening your machine to daub paint over the casing, you will probably invalidate your guarantee. The paint has to be applied in an even layer of 2 thou minimum.

However an aerosol version, possible in the future, could enable you to protect your software yourself. By coating your disk cassette storage box with paint, you could then shield the contents.

Some TV companies are considering protecting their valuable video libraries in this way.

The paint manufacturer, Bee Chemicals, is negotiating with the makers of computer casings to get shielding added to all machines.

Edword writes for the BBC

An alternative to Wordwise and View for BBC users was launched last week, and the new contender looks capable of giving them a run for their money.

Clwyd Technics, in conjunction with the CET (Council For Educational Technology), has launched the ROM-based word processor Edword, mainly with schools in mind, but it will also be available to home micro users, priced between Wordwise and View.

For educational use a teacher's pack is available containing wall charts, a teaching guide and transparencies for an overhead projector.

Edword itself comes in a user pack containing the ROM and fitting instructions, a keyboard insert, and two comprehensive manuals. One of the main features of the system is that no two keys are ever pressed down together to obtain control commands (except for upper case shift).

The system also works around a block idea starting from letter, word, line, etc all the way up to document. These blocks can be moved, copied and saved onto the current filing system. The error messages are in plain English and do not just say what was wrong but give a possible solution as well.

Edword works with any of the Acorn filing systems ie cassette, disk and network (OS>1.2). An extension to the system, Edword Plus, will be released in February at around £15, allowing you to extend the basic system in many ways with the addition of machine code routines. Edword Plus will only be available to disk and network users as it hooks in machine code programs and hence needs fast access that only disks can provide.

The basic Edword user pack, with cassette containing sample documents, costs £48.95 plus £1.50 postage and packing and VAT. With disk it is £51.95, again with £1.50 P&P and VAT. Since the system is aimed at educational establishments it will cost them a little less at £38.95 + £1.50 + VAT for the user pack (without cassette) and the teacher pack will be £28.95 + £1.50 P&P + VAT.

For more information contact Clwyd Technics, The Coach House, Flint, Clwyd. Tel: 035-283 751.

Televideo offspring

Televideo has added another micro to its ever-growing range.

The TS803H is an 8-bit, CP/M based machine at £3,818. It has a 5¼in Winchester disk drive holding 10Mb, 500K floppy disk drive, a Z80A processor and 64K of RAM expandable to 128K. Other features include a full qwerty keyboard and a 14in monitor which gives a 640 × 240 pixel.

As well as being a stand alone personal computer, the TS803H can be linked to other 8- and 16-bit Televideo computers to make up a network. And to plug in those extra add-ons there are two serial ports.

Pitched primarily at the businessman, the TS803H also has good quality business graphics with Digital Research's GSX-80 system installed. And as part of the basic package free software includes TeleWrite, TeleCalc and TeleChart.

First shipments of the TS803H should arrive in January. Contact Televideo, 0908 668778.

The Televideo range grew some with a hard disk add-on.

Advance's IBMable advances

The UK's elusive contender in the IBM-compatible stakes, the Advance, has come a step closer to full availability.

Advance has appointed Advanced Consumer Electronics (Ace), part of the Dixons group, to distribute the machine which comes in two versions, the 86a and 86b. The 86b is said to give you IBM compatibility, 128K of RAM, and twin disks for just under £2,000.

A spokesman for Ace refused to disclose its delivery schedules on the grounds that failure to meet deadlines is one of the most common and irritating features of the micro business. But sources close to Advance suggest that you might expect to see the machine on sale by the end of January. Production is under way and small quantities of the system are being shipped for the foreign market.

At the beginning of this year Advance was hoping to launch the systems in the Summer.

SOFTWARE

PCN rounds up the latest programs.

Games

Apple: Witness is a mystery game recently released by Infocom and available through Pete & Pam Computers (0706 212321) at £39.00. Each package contains a detective's dossier of clues and crucial physical evidence including a suicide note, telegram, matchbook and the news of the day. You are the witness and you are faced with motives and alibis to untangle.

Commodore: Artic Computing (0401 43553) has produced a series of games to run on the Commodore 64. Mothership, featuring 3D graphics and three different screens, sends you into space. Once you have destroyed the aliens you gain access to the mothership which takes you to home base where you have to break through the barrier of energy pods to destroy the planet's generators. Dancing Feats is a music game aimed at the user with a flair for rhythm. The range of sounds are produced by moving a joystick. Artic has also produced a series of adventure games. Each package costs £6.95.

BBC: Masterclass (061-437 0538) has released two video cassettes dealing with graphics and games. The first on the BBC micro shows the viewer how sounds and shapes are created and how to apply this effect to the game. It lasts 60 minutes. Also included are three programs which can be down loaded to the micro via a cassette recorder.

A new Apple mystery.

Electron: The second video cassette, for the Electron, follows similar lines of instruction as the one for the BBC. The games offered with this are Bounce, Blockchase and livewire. Both programmes are available on VHS and Betamax at £19.95 from W H Smith.

Business

IBM: A range of new software is now available for IBM's PC (0705 694941). Private Tutor at £29.90 provides a self-study system for home, office or classroom. Word Proof at £35.65 is a spelling check with synonyms, anagrams, and full screen editor. Learning DOS 2.00 at £19.55 is a tutor course on how to use DOS. Mailing list manager at £111.55 allows the user to enter, store, retrieve and update names and addresses with a printout on to labels. Also available is an adaptation of Apple Logo for £101.20. Systematics International Microsystems (0440 61121) has launched a word processing package costing £201.25 which runs on the IBM PC, Apple IIe & III and the Sirius. It has the usual word processing features including search, replace or remove, justification and word/character count.

Sanyo: Those thinking of buying a

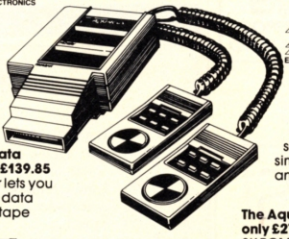
Accounting on the Epson.

Sanyo micro may be interested to know that the equipment is now being offered with a full range of Micropro Software for work processing, spreadsheets and database inclusive in the price. Prices for the micro varies according to model starting at £1,695. Further information is available from Logitek (0257 426644).

Epson: A nominal ledger package has been released by Phipps Associates (01-393 0283) for the HX20. Features include posting facilities for debits, credits and adjustments, automatic self-balancing and contra-entries and analysis of accounting data over 100 or more headings. Also available from Phipps is a cash register package which turns the HX20 into a POS terminal. Both packages cost £26.

This is the dawning of the age of Aquarius – and your computer christmas.

The Aquarius basic computer – only £49.95
8K ROM, 4K, RAM User expandable to 52K, full 49 keys, 16 colours, built-in-Microsoft BASIC, Sound channel.



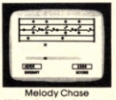
The Aquarius expanded computer – only £89.90
The Mini-expander adds two joy-sticks, two cartridge ports, two extra sound channels and allows simultaneous use of software and memory cartridges.

The Aquarius data computer – only £139.85
The Data Recorder lets you load programs and data from the computer to tape and back again.

The Aquarius computer system – only £279.80
8K ROM, 4K RAM User expandable to 52K, full 49 key moving keyboard. Built-in Microsoft BASIC, 280 Microprocessor based, 2 joysticks, 2 cartridge ports, 3-channel sound, data recorder. Plus Printer to provide permanent record of screen content graphics and upper + lower characters. Prints 80 characters per second, 40 cols in width.

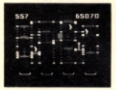
DO YOU WANT TO PLAY GAMES?

Chess
Play the computer or an opponent

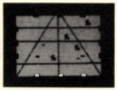


Melody Chase
Hit the notes, dodge the notes – its addictive.

Snafu
Little lines that grow – and trap you



Burger Time
Make burgers, avoid hot dogs and pickles.

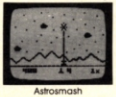


TRON Deadly Discs
Help the Walt Disney hero win through.

Advanced Dungeon and Dragons
Find the treasure, evade the dragon.

Night Stalker
On the run from robots in the maze.

Lock 'n' Chase
Rob the bank, dodge the cops.



Astrosmash
Falling rocks, bombs, missiles and UFO's

DO YOU MEAN BUSINESS?

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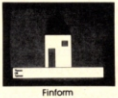

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File Form
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PCN Charts

This top 30 games list is compiled primarily from independent specialist computer outlets as well as from chain stores throughout the country. It reflects what's selling the most in high streets in the two weeks up to December 9 and, like the micro charts, does not include mail order sales. The charts this week reflect the comparative popularity of products between November 26 and December 9.

GAMES

Top Thirty

			GAME TITLE	PUBLISHER	MACHINE	PRICE
▲	1	(5)	Atic Attack	Ultimate	Spectrum	£5.50
▼	2	(1)	Valhalla	Legend	Spectrum	£14.95
▼	3	(2)	Lunar Jetman	Ultimate	Spectrum	£5.50
►	4	(4)	Ant Attack	Quicksilva	Spectrum	£6.95
▲	5	(9)	Splat!	Incentive	Spectrum	£5.50
▲	6	(30)	Metagalatic Llamas	Llamasoft	Vic-20*	£6.00
▲	7	(—)	Chequered Flag	Psion	Spectrum	£6.95
▼	8	(3)	Flight	Psion	Spectrum	£6.95
▼	9	(6)	Hobbit	Melbourne	Spectrum*	£14.95
▲	10	(28)	Pyramid	Fantasy	Spectrum	£5.50
▲	11	(13)	Horace & Spiders	Psion/Melb	Spectrum*	£6.95
▲	12	(14)	Chukkie Egg	A&F	Spectrum	£6.90
▼	13	(7)	Manic Miner	Bugbyte	Spectrum	£5.95
▲	14	(15)	Kong	Ocean	Spectrum	£5.90
▲	15	(29)	Hunter Killer	Protek	Spectrum	£7.05
►	16	(16)	Computer War	Thorn/EMI	Vic-20*	£29.95
▼	17	(12)	Arcadia	Imagine	Spectrum*	£5.50
▲	18	(25)	Sheer Panic	Visions	Spectrum	£5.95
▼	19	(11)	Hovver Bovver	Llamasoft	C64	£7.50
▲	20	(—)	Mad Martha II	Mikrogen	Spectrum	£6.95
▼	21	(9)	Jet Pac	Ultimate	Spectrum*	£5.50
▼	22	(10)	Gridrunner	Llamasoft	C64*	£5.00
▲	23	(—)	Falcon Patrol	Virgin	C64	£7.00
▲	24	(—)	Bewitched	Imagine	Vic-20	£5.50
▼	25	(18)	Zzoom	Imagine	Spectrum	£5.50
▼	26	(23)	Hungry Horace	Psion/Melb	Spectrum*	£5.95
▼	27	(24)	Scrabble	Psion	Spectrum	£15.95
▼	28	(17)	Harrier Attack	Martech/Durell	Oric*	£6.95
▲	29	(—)	Wizard & Princess	Melbourne	Vic-20	£6.95
▼	30	(21)	Purple Turtles	Quicksilva	C64	£7.95

*Denotes available on other machines

PCN Charts

Neither mail order nor deposit-only orders are included in these charts. The prices quoted are for the no-frills models and include VAT. They are updated every alternate week so you can keep a steady watch on the ups and downs.

PCN Charts are compiled exclusively for us by MRIB (Computers) London (01) 408 0250.

HARDWARE

Top Twenty up to £1,000

	MODEL		PRICE	DISTRIBUTOR
▲	1 (2)	Spectrum	£99	(SI)
▼	2 (1)	CBM 64	£220	(CO)
▶	3 (3)	BBC B	£399	(AC)
▶	4 (4)	Vic 20	£140	(CO)
▶	5 (5)	Oric 1	£99	(OR)
▲	6 (8)	Sinclair ZX/81	£45	(SI)
▼	7 (6)	Dragon 32	£170	(DD)
▲	8 (9)	Atari 800	£300	(AT)
▼	9 (7)	TI/994a	£90	(TI)
▲	10 (11)	Sharp MZ700	£240	(SH)
▲	11 (12)	Lynx 48/96	£225	(CA)
▼	12 (10)	Apple 11e	£750	(AP)
▲	13 (14)	Colour Genie	£168	(LO)
▼	14 (13)	Tandy Colour	£180	(TA)
▶	15 (15)	Sharp MZ80A	£349	(SH)
▲	16 (—)	Atari 600XL	£160	(AT)
▲	17 (—)	Epson HX20	£472	(EP)
▲	18 (19)	Aquarius	£70	(MA)
▼	19 (18)	Newbrain A	£269	(GR)
▶	20 (20)	Electron	£199	(AC)

Top Ten over £1,000

▲	1 (2)	IBM PC	£2,390	(IBM)
▼	2 (1)	ACT Sirius	£2,525	(ACT)
▲	3 (6)	Apricot	£1,719	(ACT)
▶	4 (4)	Commodore 8000 series	£1,200	(CBM)
▼	5 (4)	Apple III	£2,780	(AP)
▲	6 (7)	Kaypro	£1,949	(CKC)
▲	7 (10)	Televideo TS-800 series	£1,495	(MD)
▼	8 (5)	HP86A	£1,570	(HP)
▶	9 (9)	DEC Rainbow	£2,714	(DEC)
▼	10 (8)	Epson QX10	£1,995	(EP)

AC Acorn Computers. **ACT** — ACT. **AP** — Apple Computer. **AT** — Atari International. **BM** — British Micro. **CA** — Camputers. **CKC** — CK Computers. **CO** — Commodore. **DEC** — Digital. **DR** — Dragon Data. **EP** — Epson. **HP** — Hewlett Packard. **IBM** — IBM. **LO** — Lowe Electronics. **LL** — Lucas Logic. **MA** — Mattel. **MD** — MD Midlectron. **OL** — Olivetti. **OR** — Oric. **SH** — Sharp. **SI** — Sinclair. **SO** — Sord. **TA** — Tandy. **TI** — Texas Instruments.

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ALL TRADE ENQUIRIES WELCOME

Acorn should replace its BBC 0.1 OS

I would like to give an opinion on Acorn's policy of not replacing its 0.1 operating system (as issued on the early BBC micros) with the latest, revised 1.2 version.

This has concerned me for some time now, but the recent decision by Beebug to stop supporting the early OS, has meant a great loss to all the BBC owners with a 0.1 operating system, who will now have to find another source of information. Under the circumstances, I think Beebug is doing the right thing.

We private owners may be able to spare £10 to upgrade our operating systems, but what about all those schools and colleges with BBC computers?.

For most of them, funds are extremely scarce, and I cannot see my college being able to afford around £120 just to upgrade our 12 BBCs so they can function in the way they were meant to.

The Beeb is popular because of its logo and because the vast majority of educational establishments with computers have opted for Beebs.

Without all the support of the educational market, Acorn would have been just another surviving company, and not a leading British micro manufacturer.

I believe that in return for this support, it would be nice if Acorn were to replace all the 0.1 operating systems with the 1.2 version for all its machines being used at schools, colleges, or similar establishments.

Having said all this, let me add that I feel the necessity for this demand only because the 0.1 operating system does not function in the way specified.

PCN £10 Star Letter

Despite this Acorn deserves all the credit it has received for its excellent BBC Micro.

R G Bhanap,
Stirchley,
Birmingham.

Well, Acorn, it seems there's a good opportunity here to give schools and colleges a good start to 1984! — Ed.

Don't carry a LOAD on your shoulders, unburden yourself on *PCN*'s letters page.

A waste of everybody's time

While shopping for a computer I noticed a couple of youths trying out the latest tricks. Disabling the keyboard or setting the computer in a mode where no text appears are but a few ways in which these kids rendered computers inoperative for other customers.

In some cases the only way of correction was to turn the computers off and on again. In a busy shop this can be of great annoyance especially if it persists. Customers genuinely wanting to try out a computer may have to wait a couple of minutes before an assistant becomes available to make its use possible.

As said in issue 34, shop assistants do have a hard time. Anyone wasting assistants' time should leave them alone so they can get on with helping those who need it.

S C R Lasham,
Bungay,
Suffolk.

But this is silly. How irritating that those knowledgeable customers should cause havoc rather than helping the less knowledgeable. Ed.

Manic miner gets no respite

After reading about gaining lives in Manic Miner written by Brian Sheldon, Morecombe, Lancs, I have found a program to get endless lives.

After the first bit of loading when the screen goes black, stop the tape and press break. Type ink 7 (if you want to see what you are doing) and press enter twice. Then type 25 POKE 35136,0 and press enter. Type run and press enter.

Start the tape and carry on as usual.

Matthew Durrance,
Camberley,
Surrey.

Train the disabled in the micro industry

The microcomputer industry is rumoured to be desperate for vocationally trained staff. So why is it not taking matters into its own hands?

If people with the right kind of talent are not showing up in sufficient numbers and university computer science graduates are lacking in vital commercial insight, wouldn't the whole hi tech industry be better off training its own recruits?

I realise this means a major joint exercise which companies might shrink from at present. But a small pilot scheme could be set up by a few pioneering companies in training a section of the community which has, in effect, 'captive' students — the disabled.

Home-based employment may well be a pattern of the future with workers selling their computer services to companies and even to government. Some far-sighted people have already spotted this potential and are coming up with schemes for home-based computer employment.

My proposition is for a training scheme for selected disabled students — possibly people who have been in industry before their disabling illness — which would be undertaken by trainers from the *industry itself*. Big and small companies would have their say in what these students learned. They could be trained at the most advanced level, making them very desirable employees, the kind who do not need further expensive, in-house training when they join a firm.

The government positively encourages the employment of disabled workers with a system of grants to alter premises, and it also helps with transport, so a disabled employee might even be more punctual than able-bodied staff grappling with trains and buses.

Whether the end product of such a training scheme is a home-based worker or one working at a company's offices is immaterial; their teaching will have been relevant to their jobs.

Information Technology minister Kenneth Baker espouses an 'open door' policy for the universities in dealing with industry. He wants the academics to abandon their traditional standoffish attitude towards technology. If the professors are to dabble in development, why can't industry itself take on a teaching role instead of leaving it to others and complaining at the results?

If our 'sunrise' industries are to comprise the new industrial revolution, they must start getting their feet wet with social as well as commercial enterprise. Will someone please take the first step?

I would be pleased to hear from anyone seriously interested in promoting this scheme.

Judy Kirby,
10 The Shrubberies,
George Lane,
South Woodford,
London E18.

Share your thoughts in the UK's liveliest micro weekly letters columns. Funny, feisty or fanciful, your letter could win you £10 if it's of star status.

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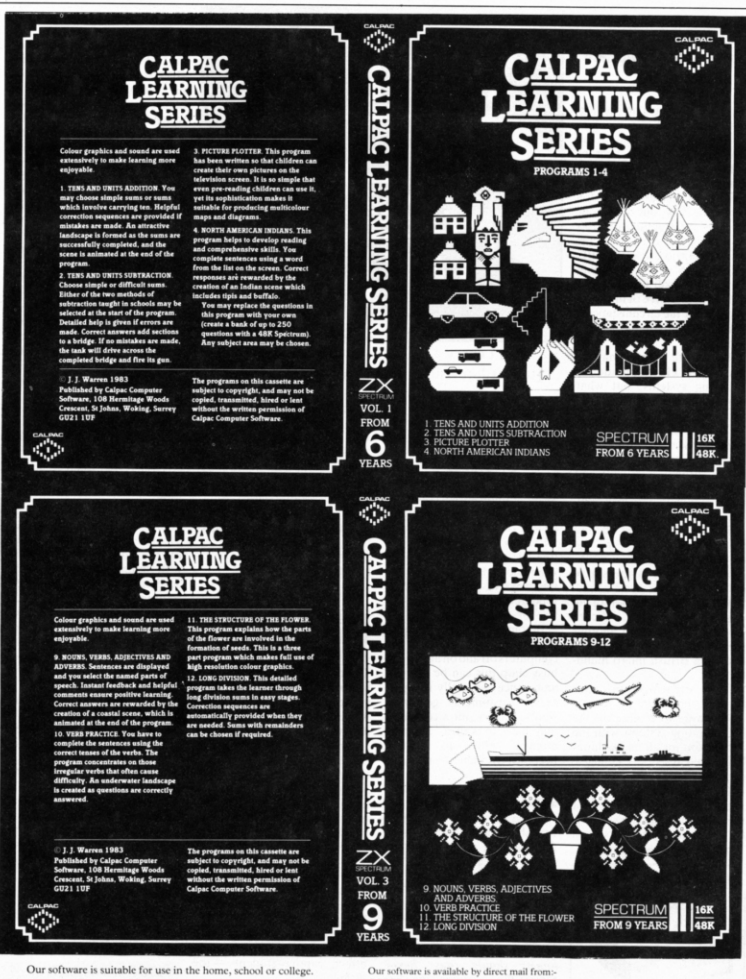

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Write to: Routine Inquiries, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

The alpha, beta and calculus of PCs

Q Could you tell me the mathematical capabilities of personal computers. If I were to purchase one, could it solve, say, a quadratic equation or work in the field of calculus? If so, could a number of standard equations be stored on a cassette and then called up at will? Or would I be as well sticking to my scientific calculator for such operations.
B Brady,
Bolton, Lancs

A All of the popular (and many of the unpopular) micros are capable of performing complex mathematical operations. The programming language Basic, the language used on most micros, originated as a mathematical, teaching language and contains a fair selection of mathematical functions (SIN, COS, LOG etc) plus arithmetical operators.

The main problem with using a micro to do mathematics is the accuracy. Normally, Basics go to nine decimal places whereas calculators go to 10 or 12. The other problem is the maximum possible value of a variable on a computer is usually around two times ten to the power of 38 as opposed to calculators which will go to ten to the power of a hundred, on average. Of course it is possible to program a computer to have whatever accuracy you like since you can specify the way the memory is laid out. This is not as easy as it may seem. Nevertheless, it is true that a computer is vastly more flexible than a calculator.

Solution of quadratic equations is easy; just use the formula $X = (-B+SQR((B^2)-(4\times A\times C))/2\times A$ for one solution and change the plus sign before SQR to a minus sign for the other. It is also relatively easy to implement complex numbers.

Calculus is also fairly easily implemented; for instance, finding the area under a curve from an equation. From the definition of integration you just need to find the area between two limits. First of all evaluate the equation at the first limit and note the value. Step along the curve a little and evaluate it again. These two values are the heights. Multiply the first by the step length to give (approximately) the areas at that point. Stepping along the curve and adding these area together will give the total areas when the second limit is reached. Obviously inaccuracy will creep in since the areas are inexact but, using a shorter step length will produce a more accurate result at the cost of taking a longer time. The following program will integrate a sine curve between O and PI:

```
10INPUT L
20LET AREA=0
30FOR T=O TO PI STEP L
40 AREA = AREA + (SIN(T) × L)
50PRINT AREA
60NEXT T
70PRINT AREA
```

The answer to this should be two but due to roundoff errors the program will only get to about 1.99999 or so. By entering smaller values of L accuracy can be gained.

Some Basics have an EVAL function or its equivalent and using this to evaluate a string, functions can be stored as strings and called up at will.

Spectrum second thoughts

Q I got a 48K Spectrum for my birthday in May — I haven't learned anything on it yet but I have about £75 worth of games. Do you think I should sell my computer, games and equipment for £180-£210, save up some money and buy an Electron, or wait till the price drops?

Is the Electron a better computer for learning about computers and how they work, for example, for my O levels, which aren't far away?

Also could you please tell me if by using a computer you can spoil the TV you are using it on, as since I started using my computer the TV has started going wrong. The rest of the family blame the computer.
K Chaudry,
Leyton, London.

A It's never a good idea to sell a perfectly good micro simply to buy another one that's pitched at about the same level.

A new 48K Spectrum plus £75 worth of games is going to cost around £200, so unless you've got some pretty special peripherals you'll get nowhere near this amount. While in some respects the Electron has advantages over the Spectrum — better keyboard, and a less exotic Basic, for example — it also has severe disadvantages.

There isn't much software around for it at the moment, and although the peripherals to upgrade it to BBC B standard will eventually be there, it may take a fair bit of time, and of course will cost you a lot more. And on top of that, first catch your Electron.

Instead of messing around looking for a different machine, get to know the one you've got. All computers have something to teach you, and the only real point in moving on is if you've outgrown it.

As for the TV problem, you can't possibly have broken it, unless you've mucked up the tuning by zipping desperately between Spectrum and *Hawaii 5-0*. The only thing your micro is doing to the TV is putting a signal through the TV aerial socket to tell it what to put on screen.

Getting into the software business

Q I have a very good idea for an adventure game based on a book. Do I have to contact the author and/or publisher if I wish to write and perhaps sell a program based on the story?

Could you tell me if the Dragon has User-Definable Graphics as I am trying to decide between buying either a Dragon or a Spectrum.

Finally, I would like to start up a software business but lack necessary information about such things as trading standards, can you advise?
Steven Holcroft,
Warrington, Cheshire.

A There would be no problem writing such a game, but if you wanted to sell it you would certainly have to approach a publisher and try to come to some sort of arrangement over copyright and royalties.

The Dragon has no facility for redefining characters, but it does have some very advanced drawing commands which let you do some very clever graphics. This, however, shouldn't be the deciding factor between buying either machine. You need to work out exactly what you will want from the machine in terms of programming, ease of use, available software and so on.

A good way to find out more about a computers' capabilities is to join a local computer club and speak to people who've had their micros long enough to discover the limitations.

As far as we know, trading standards do not apply much to software. Any promotional material you produce should not, of course, be misleading.

Setting up a business would require you to keep accounts of your trading; you would need some sort of business licence and possibly a VAT number. Contact a Citizens' Advice Bureau for details.

Black Box may cure headache

Q In Issue 36 you printed an article about a Black Box made by Lowe. I have a BBC micro B 1.2 OS which unfortunately doesn't load some of my earlier commercial software from my Elftone cassette recorder. I've had to resort to my Sharp stereo recorder to be able to play some of this software. Do you think the Black Box would help?

One more question. Are you going to index your magazine? I now have every issue and looking for a particular item is very difficult.
K C Edmonds,
Gosport, Hants

A The Black Box is reputed to work for any combination of micro and tape recorder, so provided your problem isn't related to a hardware failure of some description, it should be able to sort it out for you.

It isn't possible for us to give you a blanket confirmation that it will work, because if (as seems likely) it is related to a variation between the recording levels on your tapes, we can't tell without having your tapes and your micro in front of us.

It shouldn't be anything to do with the O/S, as the new O/S covers everything covered in the old one. Call Lowe on Matlock (0629) 4995 for further information.

As for the index, yes we will be publishing one in the near future.

Scaled a new PEEK in microcomputing? If printed your tip will earn you a fiver.

If you've got something to crow about . . . a bit of magic that'll make the world a better place for micro users, then send it to *PCN* Microwaves—our regular readers' hints and tips page. We'll pay you £5 if we print it. We'll pay you even more if your little gem gets our vote as microwave of the month. Think on . . . and write to Microwaves, *PCN*, 62 Oxford Street, London W1A 2HG.

Epson HX 20 dating call

The Epson HX-20 presents an annoying MM/DD/YY format response to the DATE$ call. A partial solution is achieved by entering the following machine code routine (either by POKES or through the monitor), after executing MEMSET 8H0A49;

Hex Address	Value
0A40	96
0A41	47
0A42	D6
0A43	48
0A44	97
0A45	48
0A46	D7
0A47	47
0A48	39

A call of EXEC 8H0A40 will then result in all subsequent calls to DATE$ returning a DD/MM/YY response. Why only a partial solution? Wait until the witching hour.

Nic Clift,
Ndola,
Zambia.

Higher resolution for BBC 8 colours

Using more than two colours on the BBC computer gives resolution a hefty knock. With the highest resolution, 649×256 pixels, only two colours may be used. For the full set of eight colours (plus eight flashing colours) we must revert to the 160×256 pixel resolution of MODE 2.

However, by using the following demo, it is possible to achieve eight colours in the. 649×256 resolution of MODE 0,

```
10 MODE 0
20 REPEAT
30 FOR I%=TO7
40 VDU 10.0,I%;0;
50 NEXT
60 *FX19
70 UNTIL FALSE
```

Note that *FX19 waits for the next screen update before changing to another colour.

There may be a slight flickering at the edges of each colour bar, but this may easily be hidden. Pressing any key will disrupt the timing cycle.

Richard Bhanap,
Stirchley,
Birmingham.

Epson HX 20 entitlements

When a program is sent to tape on the Epson HX 20, any name that has been defined with the TITLE command is not saved. This means that when the program is loaded, it has to be re-titled with a direct command.

To provide auto-titling, add the following line at the start of the program before saving to tape:

```
1 TITLE "Program name"
```

When the program is subsequently reloaded and RUN, its name will appear in the menu for future use.

Note that the title can be removed from menu by the use of the command "TITLE" in the corresponding program area.

A P Mead,
Bridgwater,
Somerset.

Meths perks up the Interface 2

I have just got an Interface 2, for the ZX Spectrum. None of the printing functions worked with the ZX Printer. On examining the edge connector at the back, it seemed to be corroded, and several of the metal strips were covered with a light coloured, powdery material.

After cleaning the edge connector with a cotton bud and alcohol (or Methylated Spirits etc), the printer worked normally.

This tip may save many of your readers returning Interface 2 for replacement.

Mike Clarke,
London.

Newbrain wordprocessing

A useful one-liner of some topicality with regard to your Newbrain wordprocessing series, (and probably applicable to other set-ups where conflicting character codes arise). To print the pound (Sterling) sign, my printer expects code 96, (or if certain control codes are set up, a code 35 which is normally hash), but the normal code for pound on the Newbrain is CHR$(228).

```
990 i=INSTR(x$,"£"):IF i LET
x$=LEFT$(x$,i—1+CHR$(96)
+MID$(x$,i+1):GOTO990
```

After execution of this line, which can be a subroutine, the string x$ is ready to send to the printer. It functions surprisingly fast, and copes with any number of embedded 'pound' signs.

A D Temple,
Withington,
Manchester.

Lynx screen INKs green

The alternative green screen on the Lynx can be used to speedily display instructions, menus etc which may be needed more than once.

To write to the alternative green screen DPOKE&6292,& 8000 (this points to the screen's top left corner), CLS then enter print instructions. Note that the screen will not be displayed, so if you wish to monitor progress use INKS 5-7. When finished, DPOKE&6292,&c000 (this resets the pointer to the normal green screen.

Always remember to return the green pointer at &6292 top &c000. This is especially important if you break into a program while it is writing to the alternate green screen. A CLS after PROTECT 0 will have no effect because the green is pointing to the alternative green screen).

Then add OUT, 20 I$=GET and RUN. &80 is the video RAM port. If bit 4 is set high (&80, 16) then the alternative green screen is displayed. If bit 2 is set high (&80, 4) then the red/blue screens are ignored. Thus OUT&80, 20 displays only the alternative green screen.

You need only set up the instruction screen once and then add a PROCDISPLAY such as:

```
DEFPROCDISPLAY
OUT&80,20
I$=GET$
ENDPROC
```

and the alternative green screen will immediately display.

M S Fowkes,
Westem Hill,
Durham City.

ZX Spectrum cursor changes

I enclose a short routine, which enables revenge on hundreds of small children constantly messing about on the micros in the large department stores. Simply type in, on one of their Spectrums:

```
10PRINT AT 10,8; "KONG is
loading":PRINT USR 1310
20CLEAR:RUN
```

Then run it and leave. It soon gathers quite a crowd.

W Mitchell,
Welton,
Lincoln.

Perks for the Spectrum Interface 1

The Interface 1 for the Spectrum has two commands not documented in the manual. These are: 1 CLS# This resets the screen attributes to their initial switch on states and clears the screen, *ie*

```
1CLS#=PAPER 7: BORDER
  :FLASH 0: INK 0:
1CLEAR#
```

This returns all streams to the channels that they are set to on switch on. This command also closes any extra channels created by the user.

Gavin Monk,
London WC1.

Shopper uses Spectrum for revenge

Microwaves, Issue 39, included a POKE to change the flashing cursor on the CBM 64. ZX Spectrum owners might be interested to learn that the same effect can be achieved on their machine. On page 174 of the manual, address 23617, called MODE is mentioned as being the state of the cursor. In the left hand column, however, there is an 'N', meaning that POKEing this address has no lasting effect, but when it is poked with a value between 1 and 255, different cursors in INPUT statements occur.

Try the following program which demonstrates some potentially useful values.

```
10FOR F=1TO7:READ A
20POKE 23617,A:INPUT "THE
VALUE IS";(A);" ";A$
30NEXT F
40DATA
142,158,160,164,224,240,254
```

Callum Gibson.
Perthshire,
Scotland

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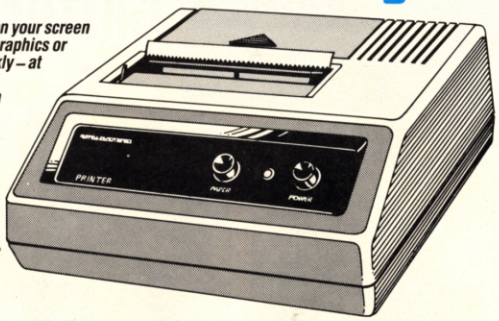

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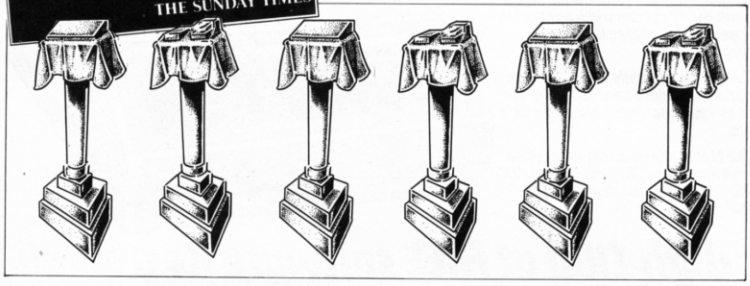
BRITISH MICROCOMPUTING AWARDS 1984

THE SUNDAY TIMES

Glittering prizes



PERSONAL COMPUTER NEWS
THE COMPLETE COMPUTING WEEKLY

THE SUNDAY TIMES

Vote for the best in microcomputing and you could win a micro and software. As part of the 1984 British Microcomputer Awards, *PCN* is offering all readers the chance to vote for the products that you think are outstanding.

BMA 1984 will be the most important event in the microcomputing calendar. It is organised by The Sunday Times and VNU, publishers of *Personal Computer News*, and *PCN* is hosting two of the awards — Peripheral of the Year, and the Home Software Award.

But because *PCN* readers are involved in all aspects of microcomputing, *PCN* is going to nominate for all ten categories. So if you want to put your favourite product in the limelight, let us know about it. A panel of *PCN* judges will consider the nominations and forward a selection to a central judging panel of experts in the micro field. They will have the task of deciding the top three nominations in each category and of choosing the winners.

On these pages you'll find a complete list of categories and the criteria on which the products will be judged. Send us your nominations on the form opposite — remembering to include the reasons for your choice. The awards will be presented at a ceremony in London in March — and you could be a winner too.

All correctly completed nomination forms will enter a free draw with two Oric micros and software as the prizes.

Categories

1 Business Micro This award will be presented to the maker of the machine which, in the opinion of the judges, offers the best value for money. Essential requirements are that the machine has a recommended price of less than £8,000 including operating system, CPU, keyboard, disks and monitor. It must be disk-based, come with at least a 90-day guarantee, and have a wide range of business software.

2 Business Software The business software award will be presented to the software house giving best value for money and optimum efficiency for general business use. The software should be disk-based with a recommended price of less than £1,500 per package or module.

3 Home Microcomputer This award will go to the maker of the machine giving the user ease of programming and displaying the best use of colour, sound and speed. Value for money is again important and the micro must not cost more than £500.

4 Home Software The software house winning this award will have published a product which does the most to aid efficiency in the home. The judges will look for flexibility, value and user friendliness. Top price is £50.

5 Creative Software The award for creative software will be presented to the inventor of a software concept which the judges rule has made the greatest use of and contribution to, microcomputing. The award will also recognise the manufacturer which first launched the concept as a marketable product.

6 Game of the Year Plenty to choose from here. Which game offers the greatest lasting appeal, playability and use of the machine? As always, value for money counts as well.

7 Consumer Award The consumer award will be presented to the company or individual judged to have done the most to advance consumer understanding and efficient use of microcomputers. The judges will look for an individual or group who have made an outstanding contribution to microcomputing to the benefit of users.

8 Peripheral of the Year This award will go to the most innovative peripheral which enhances the features and potential of a microcomputer. Good value is a key consideration.

9 Software of the Year The recipient of this award will be the software house judged to have published a product providing the simplest way of effectively solving a problem. The software will be judged as an aid so the judges will examine the way it carries out the task the user wants to complete. User friendliness, flexibility and value are of prime importance.

10 Microcomputer of the Year The micro will be the one which, in the opinion of the judges, is the best to have appeared on the market in the year to November 1. User friendliness, flexibility, software support, expandability, good design and price will be taken into consideration. Recommended price must be less than £8,000 and new versions of older models are eligible.

RULES

In categories 1-5 (business micro, business software, home micro, home software and creative software) manufacturers may nominate their own products which need not have been made in Britain but must have been available for purchase from retail outlets in the UK by November 1, 1983.

In categories 6, 8, 9, 10 (game, peripheral, software and micro of the year) manufacturers may nominate their own product which need not have been made in Britain but must have been available for purchase from retail outlets in the UK between November 1, 1982, and November 1, 1983.

Employees of VNU Business Publications BV, the sponsors or any individuals associated with the British Microcomputing Awards are ineligible to place a nomination with the exception of the six VNU title judging panels which may each nominate up to six entries.

The decision of the judges is final and no correspondence will be entered into.

All nominations must be received by noon on January 5, 1984.

WIN

Two Orics and software

Nominate and you could be among the winners

Enter your nomination for each category and explain, in not more than 30 words, the reason for your choice, using another sheet of paper if necessary. You should consider the guidelines given in each category on the facing page.

Category 1: Business Micro .....
Reasons for choice .....
.....

Category 2: Business Software .....
Reasons for choice .....
.....

Category 3: Home Micro .....
Reasons for choice .....
.....

Category 4: Home Software .....
Reasons for choice .....
.....

Category 5: Creative Software .....
Reasons for choice .....
.....

Category 6: Game of the Year .....
Reasons for choice .....
.....

Category 7: Consumer Award .....
Reasons for choice .....
.....

Category 8: Peripheral of the Year .....
Reasons for choice .....
.....

Category 9: Software of the Year .....
Reasons for choice .....
.....

Category 10: Micro of the Year .....
Reasons for choice .....
.....

Your name .....
Address .....
.....

Send your nominations (before noon, January 5, 1984) to:
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PERSONAL COMPUTER NEWS
THE COMPLETE COMPUTING WEEKLY

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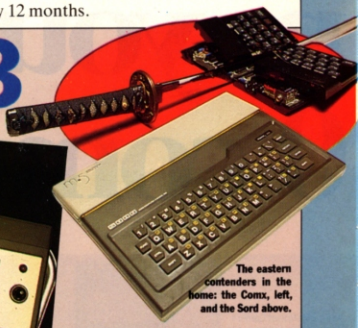
What a year it's been . . . Richard King looks back on a busy 12 months.

Goodbye '83



The eastern contenders in the home: the Comx, left, and the Sord above.

Looking back over a year, it's easy to forget what's happened and feel nothing much did. Yet for the micro industry, 1983 has been the busiest yet.

It all began with two significant events: the release of Apple's Lisa, and the entry of IBM into the world market. In itself, Lisa hasn't made a major impact, doubtless due to its high price, which even with the recent £2,000 price cut is more than most budgets will tolerate.

However, the ideas Lisa incorporates have been recognised as very worthwhile, and are now used in many programs, giving the phrase "user-friendly' real meaning. Atari's paint-box program for the 600 is a very good example of putting Lisa technology to use.

Functionality is the main feature of the IBM-type of machine . . . the real McCoy itself is a classic example, which like many of its clones is large and strongly built. Competition even in this field is getting fiercer, and could bring a welcome drop in the currently high prices. (The memory size/price equation in the business field remains considerably higher than in the domestic market.)

Standardisation is an issue well aired in 1983 bringing the MSX standard into play among Japanese and American companies.

If it works, home users will reap the benefit next year when there could be an influx of low-priced machines with advanced features and compatible software.

But it's not all good news. Some home users will have suffered when Texas Instruments decided the TI/99/4 would never compete, and closed down the consumer division to concentrate on the TI Business Computer. The massive price cut to £99 cost the company considerable sums and lost money despite healthy sales. Thus even the giants stumble. Perhaps the saddest casualty in this case is that the very interesting (and blindingly fast) TMS 99-Series of processors may be largely ignored by designers, since the TI Business Computer uses a boring old 8086.

But TI was not the only company to hit hard times. Osborne fell victim to the fast moving micro industry and shocked both us and the UK with the suddenness of its demise. The fact that the company never managed to produce more than sample copies of the Osborne Executive possibly triggered events. An Osborne upgrade was long-overdue and when it followed the familiar pattern of announcement and delay, the cash-flow may have suffered.

Apart from that, the year was fairly kind to the whole industry; and the buyers were kinder to the manufacturers than they deserved, since their record of premature announcements and unfinished or incompletely-debugged products was as dire as it's ever been.

Some companies manage to be slack about delivery times, final prices and quality control.

But on the whole the year showed hopeful trends: improvement in service, and some interesting new machines. Of particular note are the Elan and the Memotech, both of which could prove popular with reasonable price-tags and (on paper at least) impressive specs.

The most welcome step forward in 1983 was the recognition that while hardware may be important, and ultimately dictates the capacities of a system, it's software that really matters to you and me.

Lisa was the most obvious example as it is a machine built to run particular software. There's also Occam, a multi-processing language developed by Inmos to control large numbers of asynchronous transputers. Other examples are VisiOn from Visicorp, the recently announced Window extension to CP/M-86, the Multidraw environment for the Gibson Light Pen on the Apple, and Atari's painting and drawing program which also uses a light-pen.

The main ideas were Icons, Windows and pointing devices, all of which were the subject of research at Xerox's PARC (Palo Alto Research Centre), and were embodied in the Smalltalk language resulting from that work.

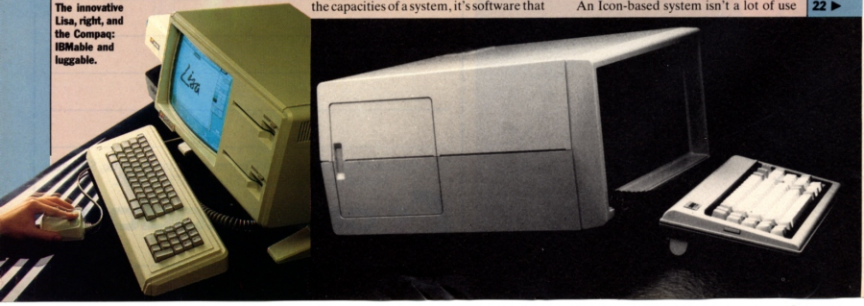
Each is being developed for smaller machines at more homely prices, sometimes independently of each other, sometimes together, depending on how useful the software house feels each to be.

Windows, which allow multiple tasks to be handled at once, (at least from the user's point of view), are perhaps the most popular, and have found applications in many fields.

Icons, due maybe to their relatively heavy memory requirements, are less popular, but as the graphical capabilities of more advanced machinery trickles down the scale, we will probably see more use of these.

An Icon-based system isn't a lot of use

22 ▶



The innovative Lisa, right, and the Compaq: IBMable and luggable.

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◄ 20

without a pointing device, and several variations on this appeared. Mice, or mouses, caught the imaginaion at first, and generated a lot of interest in the Spring and Summer, but interestingly they became distinctly less celebrated as the year drew to a close.

Light-pens, in particular for the BBC and new Atari machines, appeared, but Hewlett-Packard went overboard and produced an elegant finger-detecting dingus, so you could point at the screen of their 68000-based machine.

Business Machines

Big Blue is so big it was inevitable that a huge bandwagon got rolling almost immediately. Unfortunately, the resulting product-range is notable for its fragmentation, with literally dozens of variations on the IBM theme. However, three major trends are apparent, though all claim some compatibility. 'Compatible' now has several different meanings. One is the dictionary definition, signifying that anything which works on the IBM will work in exactly the same way on other machines.

The second is that it works much the same, at least as far as software and disk-formats are concerned, but not hardware, which generally includes the ability to run most programs written for the IBM. The third is that it can read IBM disks, but probably not write them, and in all respects is a different animal, though it may run versions of the same operating systems or programs.

As for the machinery itself, most was competent, and apart from minor teething and delivery problems, most did their job adequately. Little of it was inspired, but generally that's no weakness in the office market, which prefers reliability.

Above: the graphics specialists, the Tiger and the Mupid. Left: The Ajile, one of the first semi-portables offering a degree of IBM compatibility.

From the Far East

Standards were much on the minds of some Japanese and American companies, who put together a definition for a type of machine to be called the MSX. Essentially it's a hardware definition, but there are software aspects. MSX is intended to provide a uniform environment for programs.

As it stands, the defined MSX machine is not quite stunning. It's built of such units as a Z80 processor, 64K of RAM, a TMS 991B video-processor, a NatSemi sound generator and Microsoft Basic, so in many ways it's more of an attempt to codify and control the current situation as it stands, rather than forge a path into the future. The full definition hasn't been published, but it seems there's no provision for extension to the facilities, nor for alternative chips to be used instead of those listed, and they aren't the latest thing around.

Sord, however, went very much its own way, a characteristic which might become its trademark, with its ingenious but different software, such as PIPS and FALC.

Its M5 machine which was picked up by CGL and badge-engineered, represents the peak of Japanese product-design and engineering, but will nevertheless continue to face stiff competition from other eastern companies as well as from the likes of Sinclair.

The rest of the Orient wasn't slow with interesting designs such as the Comx-35 from Hong Kong. Sadly Taiwan's blackened image has not lifted and hardly a month went by without some story of piracy emanating from that quarter.

It was evident that the full attention of the Far Eastern electronics companies is far from fully focused on the micro, though, and 1984 should bring many more machines from there.

Communications

The one form of Input/Output poorly served until recently has been communications, but 1983 saw the launch of several machines which had it as their *raison d'etre*. First in line was the Torch, and the dual-processor layout, in this case using a 6502 on a BBC micro as the I/O processor and a Z80 applications processor, was echoed in several other machines, notably the HH Tiger.

24 ►

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The first of the true portables, the Epson HX20, suffered from its small screen.

A British portable contender, the Portico Miracle

This machine is also heavily biased towards communications but has advantages over the Torch, with more advanced innards in the form of a 6809 I/O processor, the applications-processor which is constrained to run CP/M is a Z80. The graphics, however, are handled by an NEC 7220 graphics chip which gives remarkable and fast image-handling.

Impressive graphics were a major feature of the Mupid, a machine even more graphics oriented than the Tiger. The Canadian Telidon graphics protocol was used, together with the regular teletext type, producing a dual-standard machine which can produce images with 212×256 dot-resolution in eight colours which may have eight grey-scales. But it has no local storage apart from cassette, since the work is intended to be kept on a Prestel Central Computer *ie* not using the Mupid as a computer but more a very intelligent terminal with local memory.

The major restriction on wide usage of communications, however, remains the protocol problem, and until someone makes a move to recognise one of the options available, such as Ethernet or the Cambridge Ring, we won't see much more progress. Again, the hardware is there — now we need the software.

Luggables and Bundling

There was much activity from companies offering machines classed as 'portable', and which are more accurately described as 'luggable'. The habit of bundling software continues in this field, with the Pied Piper Communicator selling with the 'Perfect' range, in common with several others.

The Anderson-Jacobson Ajile, which is virtually indentical to the Hyperion, was among the best designs, being quite small and not too heavy. The Portico Miracle, despite its ordinary eight-bit CPU, is well up in the speed stakes thanks to its efficient cache-memory. But it's too hefty to be classed as even luggable, and the shoulder-strap, though strong enough, is more of a wishful thought than a serious idea.

It too, had bundled software, and it's debatable whether it's the free software which sells these machines, rather than their minimal portability, offering as it does, a straightforward startup and at least a familiar if not unified, front-end.

This particular class of micro had some quite interesting facilities. Communications were included in the Ajile, both Z80s and 8086s were used as CPUs, memory with expansion was as large as half a Megabyte on occasions, but in general graphics were left out.

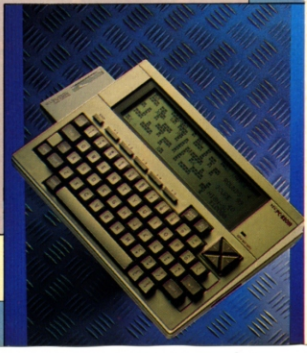
Portables

In many ways the most exciting development of 1983 was the arrival of tthe genuinely portable computer; that is, a machine which operates with no external power-supply or screens, and which has built-in programs and data-storage.

The Epson HX-20 was the first, and having a proper keyboard distinguished it from the earlier 'portables' which were more calculators than computers. Almost a year later the Tandy Model 100 appeared, and with a screen 40-characters wide and eight lines deep, and a good keyboard, the real Buck Rogers article was available.

Underneath, the machine is just about the same as the NEC portable, and it is likely other companies will use the same basic units, so some degree of interchangeability will develop.

It doesn't take much imagination to suggest that the 'true portable' is the real long-term survivor, and may be close to the eventual form of a micro.



Left, and right, similarities only skin deep in the Tandy 100 and NEC 8201A — the shape of things to come? Above, the mutant Pied Piper offers a portable disk system but no display.

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AM-ZXMON is a superb machine code monitor and operating system which allows you to create, edit, run, and checkpoint machine code routines, and to save them on tape. You can build libraries of your own routines on tape, and merge them into new programmes. On the Spectrum you can break into machine code programs. AM-ZXMON is THE OPERATING SYSTEM FOR THE OTHER PROGRAMS BELOW.

ZX81 version £6.00 **Spectrum** version £7.00

On the **ZX81** you can create assembly language source tapes and assemble them into machine code using **AM-ZXEDIT** and **AMAZON**, running under the control of AM-ZXMON. AMAZON can assemble programs of up to 6K in size at one time, and accepts user symbols, hex., decimal, and string constants, and the full Zilog mnemonics.

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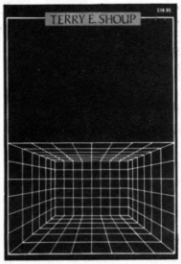


'Numerical Methods for the Personal Computer' by Terry E Shoup, published by Prentice-Hall, 66 Wood Lane End, Hemel Hempstead at £16.10 (paperback, 238 pages).

It's a little-recognised fact, but excellence at mathematics is not particularly common in users of microcomputers or any other computer come to that. Many are much better at languages than sums.

This being so, Terry Shoup's new book, 'Numerical Methods for the Personal Computer', addresses a subject of great importance, virtually for the first time.

I wish I could say it's as usable as it is useful, but sadly, Mr Shoup is considerably more of a mathematician than most of us, and his book is irritatingly full of bits like: 'In the (Rutishauser) method a matrix A is decomposed into A = LR where L is unit lower triangular and R is upper triangular. Using the similarity transformation L AL, we see $A_2 = L^{-1} AL = L^{-1}(LR)L = RL$. Thus $A_{m-1} = L_{m-1} R_{m-1}$ and $A_m = R_{m-1} L_{m-1}$. This process is repeated etc, etc . . .'

Eh? What? Don't know what he's on about, and couldn't find explanation in the text. Apparently, familiarity with fairly advanced mathematical theories is needed before it's comprehensible.

It is sad that the notations are not explained because they are far from universal. And although this book appears to be for newcomers, it is written for competent mathematicians.

This is not to say you'd get nothing from it. The Basic programs, which apply most of the methods described, are too good to ignore. They are excellently structured, well commented, and apart from the lack of error-traps for invalid, impossible or imcomplete data, work correctly.

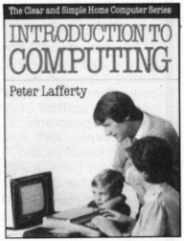
Unfortunately, there is little or no link between the mathematical text and the program listings.

The best use I could make of the book was to snitch the code, convert it into C and stick it in the library, so I'd have heavy-duty extensions to the mathematical functions. Provided the subroutines work correctly, I'm not bothered exactly how the mathematician arrives at the original equation.

At the back of the book there's a clue to the intended audience . . . a large glossary of computer terms, but none of mathematical ones.

Thus as a library of complex algorithms for mathematically-incompetent programmers to drag out and use, this book has its uses. Alternatively, it is a good introduction to Basic for non-computer-literate mathematicians.

RK



'Introduction to Computing' by Peter Lafferty, published by Frances Lincoln Ltd at £4.95 (paperback, 188 pages).

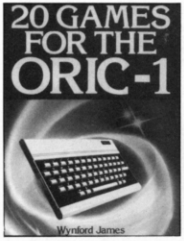
You don't have to know how a car works to be able to drive it, but a little knowledge can be very useful.

To pursue the analogy, Peter Lafferty's 'Introduction to Computing' doesn't say much about the 'driving', with only one chapter on writing your own programs, illustrated by a rather standard game called Tank Attack. Instead this book is intended for those who wish to peer under the bonnet.

It gives clear and readable information about the microprocessor, ROM, RAM, interfaces and busses. It also gives a very detailed explanation of what happens from the moment you press a key to when a program runs. There is a chapter describing peripherals to expand your system and a concluding computer review tabulates details of current models. There is also guidance on how to choose a computer and what questions to ask yourself before buying.

The book is illustrated with diagrams, which in some cases hindered rather than helped. But despite such drawbacks this book is an easy way to get a basic grounding in computer hardware.

NR



'20 Games for the Oric-1' by Wynford James, published by Micro Press at £5.95 (paperback, 117 pages).

This comparatively low cost book offers 20 well presented and good programs. At the start of each is a witty drawing, followed by a brief explanation of what the program does and how to play it. Next come program notes which detail how the program is constructed and how it works, and a list of important variables used in the program. This is followed by the listing itself.

This arrangement makes it possible for the reader to learn about the program before dealing with the code, which on its own might be confusing.

The book's introduction explains some points that the manual misses, and though this clarifies a number of problems the Oric user may have quite early on, it does give the impression of being instantly technical, and possibly daunting.

The games are a mixture of old favourites such as Caterpillars, Asteroids, the shoot-'em-down type, old not so favourites like Sheepdog Trial, and new ideas. One odd one, the Artificial Intelligence Program, is a Noughts and Crosses game played on a four-by-four cube (actually four squares), but with little artificial intelligence.

PL

'The Bytes Brothers Input an Investigation' by Lois & Floyd McCoy, published by Armada at £1.25 (paperback, 109 pages).

This is the first in a quartet of programming-oriented mystery stories. The setting is suburban USA and the leading characters are the male progeny of the Byte family, who seem to be aged around 13.

The Byte kids are micro enthusiasts and use their computer (called Nibble) to solve sundry problems that crop up in suburban life. Exercises include hunting down a felon who steals a sledge, solving a pollution problem and winning a 'how many marbles in the jar?' competition.

Working the micro into the plot requires a little stretching at times, and the dialogue tends to be smattered with expletives like 'Holy Macro', but the idea is good.

The object of the book is to teach Basic programming, so each of the mysteries is solved by the application of microcomputing. This stretches the credulity of the reader again, but then the plot itself is really an extended REM to link the programs together.

The programs are good starter material, and the functions of the various program sections are explained neatly during the dialogue.

More mysteries are to follow: The Byte Brothers Program a Problem, The Byte Brothers Enter the Evidence and The Byte Brothers Compute a Clue. Mr and Mrs McCoy are certainly fond of alliteration.

IS

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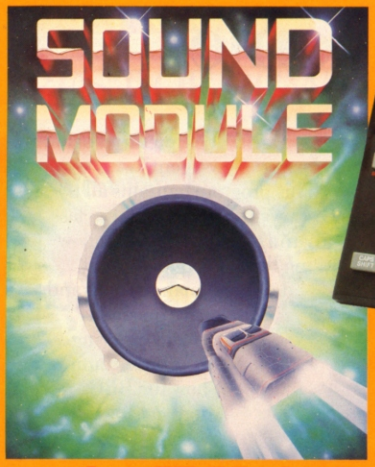

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Not all home computers stay at home.

The BBC Micro is the ideal family computer—simple to operate, yet fast, powerful, with enormous potential.

But it's nice to know, when you buy one for your home, that the business, educational and scientific worlds agree with your choice.

Here are a few stories to illustrate how the BBC Micro gets out and about. And one to remind you how helpful it can be when it stays at home.

A practical lesson in business admin.

The contribution of the BBC Micro in the classroom has long been recognised at Perins Community School in Hampshire.

The School has 12 BBC Micros used extensively across the syllabus: in fact some pupils are using them to study for their GCE O Levels in computing.

One of the programs available to Perins teachers such as David Beck, pictured below with his class, is "Newsagent."

This program contains all the necessary information for the class to run a newsagent's shop; allowing them to organise daily deliveries, make up bills and keep an eye on stock control and ordering.

It's a nice example of how the BBC Micro can be used not only to acquaint a class with the language of computers, but also with some of the realities of the community in which they live.

Correcting Jodrell Bank.

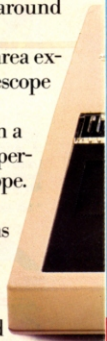
The BBC Micro is a familiar worker around Jodrell Bank.

You'll find it in the reception area explaining the workings of a radio telescope to visitors, for example.

But it's also been helping in a more testing task: to improve the performance of the Defford telescope.

In this application it has been used to make calculations necessary to determine the precise parabolic shape of the dish.

Theodolites are used to do the measuring—then the BBC Micro works out the necessary corrections.



The end of the scrawl.

If any of you have noticed how much easier it is to read and understand labels on drugs and medicines these days, then you can most probably thank the BBC Micro. John Richardson, a Preston pharmacist, was first to realise how a micro with a suitable printer could produce labels that were accurate and legible and which could include, automatically, such information as drug reaction warnings.

At the same time it could record drug usage for better stock control.

He chose the BBC Micro for its versatility and potential for expansion.

John Richardson believes that this system will be recognised as standard in the profession and be used in hospitals, health centres and pharmacies throughout the UK.

Meanwhile back at home.

Dr. & Mrs. Yarwood bought a BBC Micro as a birthday present for their 12 year old daughter.

However, it quite quickly became common property.

All three can now write their own programs. Mrs. Yarwood is particularly proud of one program she has compiled to help teach her daughter French vocabulary.

They all agree that although the Micro is fast and powerful enough to be at home in Jodrell Bank, it is also the ideal computer at the Yarwood home: simple to set up (virtually any TV set and cassette player is all you need) and simple to use.

All this for only £399.

The BBC Micro comes with a comprehensive, step-by-step User Guide which introduces you to your micro and shows you how to construct useful programs of your own.

You will also receive a free "Welcome" cassette which contains 15 different programs for you to experiment with, ranging from music and graphics to games like Kingdom and Bat 'n' Ball.

The BBC Micro is available from W H Smith Computer Shops, Boots, John Lewis and local Acorn stockists.

Alternatively if you would like to order one with your credit card or if you want the address of your nearest supplier just phone 01-200 0200 or 0933-79300.

The BBC Microcomputer System.

Designed, produced and distributed by Acorn Computers Limited.

Tony Escott

With a micro, the world is just a phone call away. Your tour guide is Tom Sato.

Trip around the world

Scene: a computer centre at one of London's leading Universities. Date: late 1981.

The university had just installed a brand new computer system to cater for the growing number of computer users. One afternoon an operator looked into the VDU as the computer came up with a very unusual message. It said:

>GOING

The operator wondered — surely we haven't written the computer's operating system to give that kind of message? One minute later, the computer sent another message to the operator:

>GOING

The system manager was called to the scene. He too was puzzled. Another minute, and the computer sent a final message:

>GONE

And the whole system crashed. The system manager's face reddened as he realised that someone had just successfully

zapped the computer with a 'time bomb'.

It wasn't the first time someone had deliberately crashed the university's computer system in this way. A time bomb, which is a program that causes the computer's CPU to grind to a halt, had been used once before.

The first time round one of the operators was foolish enough to claim to a student friend that he could never crash the computer completely. He was proved wrong, much to his embarrassment, when the computer went berserk, started erasing the massive Winchester disks then crashed.

He was 'kind' enough to let this happen straight after a full back-up of the disks had been taken, so the system was soon restored to order. But if the culprit hadn't come forward to boast his achievement the computer centre would not have been able to find out who crashed the system. All traces of evidence were removed when the computer erased its disks.

When the computer was timebombed a second time by a different student, the culprit was caught and banished from the computer centre forever. Nevertheless, as these two incidents indicate, it is all too easy to crash a big computer.

Here the culprits were students working inside the University, but it is relatively easy for an outsider to access the system via a network and cause mischief.

On the network

Nowadays, most major computers are networked via telephone lines. Simply by browsing, it's possible to log on to computers you didn't even know existed.

Using a university network, one computing student connected his terminal to a network in North England through another network in London. From there he managed to log on to a computer in Newcastle as a visitor without having any prior knowledge of log-in names or passwords.

'It's easy,' he told me. 'If you don't know which computer is connected to which network, just ask for a directory or help; the more complicated the system is the more help it gives. Most computers have a provision for short-time visiting users, so log-on as that.

"The beauty of the system is that once you go through several networks there is no way of tracing back to you. The operator of the system would not notice that you are illegally using his computer, because it's quite usual for a visitor to be using the computer, and the computer can't tell whether you are 1,000 miles away or right next to it.'

Network trekking made an unscheduled appearance on BBC television's Micro Live, a four hour programme about micro computers shown as part of the BBC's computer literacy project.

Viewers using British Telecom's Gold system, which provides subscribers with an electric mailbox service, were asked to send in messages while the programme was live on air. Two hackers — computer jargon for people who break into networks and mainframes using a micro and a modem — got into BT's brand new Gold system, supposedly for subscribers only, and cracked the BBC's password.

When the demonstration began, expert John Coll couldn't even get through to the system. The phone lines were so jammed up that he had to get in through an alternative route through another network.

All this was done on live television with the camera focused on to the VDU, and when he eventually connected up his BBC micro and typed in his account number and the secret password, up flashed the message:

COMPUTER SECURITY ERROR — ILLEGAL ACCESS

then followed by a taunting message:

I HOPE YOUR TELEVISION PROGRAMME RUNS AS SMOOTHLY AS MY PROGRAM WORKED OUT YOUR PASSWORD. NOTHING IS SECURE. signed "THE NUTCRACKER (HACKERS UK)"

Demonstrator John Coll was flabbergasted as he explained what it was, while Ian McNaught-Davis — the regular presenter of BBC's Computer Programme — happily read the poem which followed, entitled 'The Hacker's Song':

Put another password in,
Bomb it out and try again;
Try to get passwords logging in,
We're Hacking, Hacking, Hacking.
Try his first wife's maiden name,
This is more than just a game,
It's real fun, just the same,
We're Hacking, Hacking, Hacking.
Hi there, Owlets from Oz and Yug.

While John Coll was demonstrating the electronic mail service, the Hackers sent the BBC another message, this time in express so that the title of the message was displayed immediately on the screen:

PEOPLE OF THE WORLD UNITE MESSAGE FROM OZ AND YUG

The actual message was ignored by the presenters, but it was probably about how to break into networks and computers around the world.

In universities and research institutes across the US there is currently widespread paranoia about hackers. The number of cases of time bombs, of hackers using up valuable computer time, and of theft of confidential data from commercial organisations has risen almost in parallel with the micro computer boom.

One gang of teenage computer fanatics calling itself 414 after the local area code for Milwaukee was apprehended by no less than the FBI.

The 414s began hacking away at phone-connected computer systems all over the country in mid-May. By June they had penetrated over 60 systems, including a VAX 11/780 at the Sloan Kettering Cancer Institute in New York and a computer data bank at Los Alamos nuclear research facility.

To log on to the computers, which they found through telephone lines, they used a home computer, a modem and the relatively simple manufacturer's 3 digit code words which are used for the initial installation of computers.

Many large system buyers are foolish enough to retain such codes to make it easy for the repairmen to get into the system when it breaks down. But, using a home computer it is quite easy to write a program to crack a code for you.

The password you need after you have logged on to a computer is also vulnerable. People tend to use their own or their family's names, and this is obviously asking for trouble.

Real time action

Many of the security problems being experienced today arose because the experts who designed the original systems underestimated the power of modern home computers. Even a Sinclair Spectrum can be connected to a DEC VAX11 system using an RS232 interface, so thousands of people could start messing around within a very short time.

And computer hacking is very addictive. Hackers see it as real life adventure. It's not just a game confined within the RAM of a Sinclair Spectrum — it's a real time trek around the globe.

In the old days, when there were only a handful of low-cost micros on the market, computer hacking was confined to people inside universities and research institutes who knew what they were doing. They were computer scientists and expert programmers who in their spare time hacked their way to various places to communicate with fellow experts or to have a game of chess or play an adventure.

Some even went as far as boasting about it in the letters pages of computer magazines. One member of Essex University Computer Club wrote in to say:

'Not only did we frequently go to America via satellite links for odd games of Zork (an adventure game for mainframes), but they came over in droves to play MUD (Multi User Dungeon adventure game for the PDP-11). The vision of playing people in Australia is not all that strange; we regularly killed people from MIT, Stanford and UCLA.'

They did this free of charge because BT didn't notice the loophole for quite a long time. By the way, MUD can now be played on most micros by dialling into Essex University's system, but you'll have to pay the phone charges.

The people who started this whole business of computer hacking didn't go around stealing data files and disrupting somebody else's computer. They used their knowledge responsibly because they knew how difficult it is to maintain a large system.

But now things have changed. Teenagers and amateurs are getting into networks and computers and causing widespread havoc and paranoia.

The security of computers urgently needs to be tightened up. Now that the micro-computer boom has reached new peaks, it's the computer security industry's turn to expand within the very near future.

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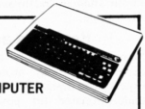

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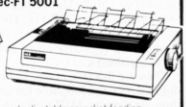

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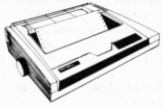

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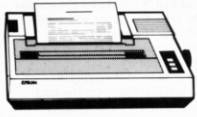

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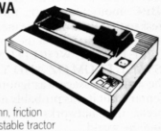

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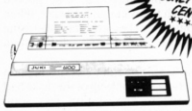

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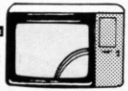

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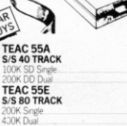

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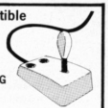

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Wordwise wisdom

Many of you will have purchased the Wordwise chip and found it to be generally excellent. But you'll also have discovered that the 'CE' command for centering text doesn't work as it should when you try to underline or use other than normal text modes.

Fortunately, the same is not true of the 'TI', temporary indent command, which always gets it right. The snag is, how do you calculate all the indents required?

The objectives of this article are twofold. First, to produce a simple Basic program which will perform the necessary calculations, and second, to demonstrate a way in which both Basic and Wordwise can peacefully co-exist in memory without either corrupting the other.

First the Basic program. This is quite straightforward and should be typed in as shown in the listing below. Save it to tape or disk with a suitable title, *ie* SAVE"CENTRE".

To achieve the second objective, it is necessary to make use of an *FX call, in this case *FX180. The actual syntax is *FX180,n where n is a decimal number equal to the high byte hex value to be set as the operating system high water mark. The default equates to the default value for PAGE.

As an example, with disks, PAGE defaults to &1900. To achieve our objective, we must make PAGE default to a higher memory location. &2000 will be sufficient for the present purpose so enter *FX180,32. (32 being the decimal for &20 hex). If you now type PRINT PAGE (in hex) you will see it is &2000.

The point of all this is that by entering *FX180,32 before entering Wordwise for the first time, it will be forced to load at &2000 instead of &1900 as it usually does, thereby leaving 1792 bytes free for the Basic program and variables.

So, after the technical bit, how do we make it all work? Proceed as follows:

First, load the Basic program from tape to disk. Do not run it, but enter *FX180,32. Press RETURN. Enter *WORDWISE (or *W.) and press RETURN.

Now, from Wordwise menu mode set up one of the function keys as follows: (I will use KEY0 as an example)

*KEY0"B.! MPAGE=&1900! MOLD! MRUN!M

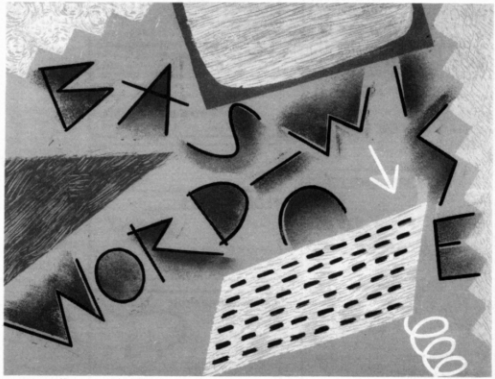
When entering text and you come to something you require to be centred, enter the embedded command code 'TI' followed, if you wish, by others for underline, enlarged *etc*, but leave out the number for 'TI', followed by the text to be centred. Return to menu mode and press CTRL/SHIFT together with key f0. Use the Basic program as instructed. Return to Wordwise edit mode and insert the indent number you were given immediately after the 'TI' command. This is the only non-automatic part of the process.

In practise, I find it quickest and easiest to enter all my text in Wordwise, leaving out the 'TI' number. I then use 'CENTRE' and make a note of all the text to be centred together with the respective temporary indents. It is then a simple matter to return to Wordwise and insert all the indent numbers at one go.

Two final points. The Basic program assumes starting in normal text mode with A4 size paper, although the formulae could easily be adjusted to cater for other options. Also, the number of characters free for text storage is of course reduced, but this is no great hardship, unless you intend writing a book . . .

Note: Tape users should change all reference to &1900 to &E00.

Wordwise Users should use code 0C27,33,36 if selecting option 4 in the program.

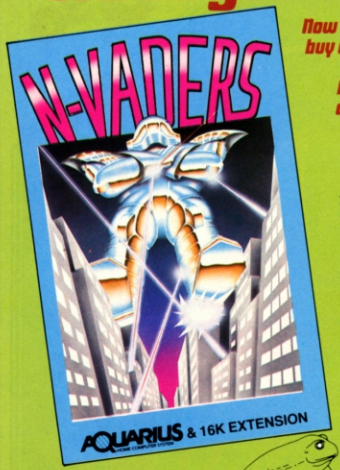


Paul Leith

BASIC PROGRAM: INDENT CALCULATOR

```
   5REM**CENTRE**
   6REM**By. T.G.Holden**
   7REM**Program subject to Copyright**
  10CLS:INPUT''"REQUIRED TEXT ? "T$:L=LEN(T$):PRINT''"1 =
NORMAL""2 = ENLARGED""3 = CONDENSED""4 = CONDENSED
ENLARGED""CHOOSE 1 2 3 OR 4
";:REPEATA$=GET$:UNTILA$>"0"ANDA$<"5":PRINT">";A$;"<"
  25INPUT"LINE LENGTH ",LL:
  30IFA$="1" THENTI=INT((LL-L)/2) ELSE IFA$="2"
THENTI=INT(LL/2-L) ELSE IFA$="3" THENTI=INT((LL-(L/1.65))/2)
ELSEIFA$="4" THENTI=INT((LL-L)/2)-1
  40PRINT''"TEMP INDENT IS ";TI:PRINT"EMPHASISE AND
UNDERLINE""MAY BE ADDED IF REQURED"
  50PRINT''"REPEAT Y/N ?":A$=GET$:IFA$="Y" OR A$="y"
THENRUN ELSE PAGE=&2000:*WORDWISE
```

We've got the Aquarius taped!



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PCN ISSUES

Issue 1, March 11-18.
Pro-Tests: Apple's Lisa, Texet TX8000; Spectrum speech synthesiser, Apple printer, Commodore network; 3D on Spectrum, graphs package for Apple and IBM, BBC graphics system.
Features: computer chess, Occam parallel processing language, Victor/Sirius function keys.
ProgramCards: Towers of Bramah (Pascal), Biorhythm (Apple II), Roman Numerals (Apple II), Shape Utility (Apple II).
Gameplay: Darts, Soccer (Atari); Castle of Riddles (BBC Model B); Pimania (Spectrum); Flight Simulator (IBM PC).
Databases: micros and peripherals.

Issue 2, March 18-25.
Pro-Tests: Toshiba T100, Casio PB100, ZX81/Basicare, Vic speech synthesiser, Spectrum spreadsheet, IBM graphics, BBC word processing.
Features: Colecovision, micro backgammon, nursery computing.
Gameplay: Ultima II (Apple), Trader (ZX81), Starquest (Vic 20), Hungry Horace (Spectrum).
ProgramCards: String editor (Spectrum), Analogue Clock (BBC Model B), Chart generator (Spectrum), String extract/replace.
Databases: full software listings.

Issue 3, March 25-April 1.
Pro-Tests: TI Professional, Apple speech synthesiser, Facit 410 printer, IBM keyboards, Petspeed compiler, Sirius toolkit, Dragoncalc.
Features: Atom upgrade, Lynx programming, Apple music.
Gameplay: Mangrove (Vic 20), Mutant Herd (Vic 20), Compendium (Dragon), Patience (Spectrum), Noughts and Crosses (Dragon), Great Britain Ltd (Spectrum), Ulysses (IBM PC).
ProgramCards: Magnify (Spectrum), Spider (Vic 20), Firing Range (BBC).
Databases: micros.
Micropedia: Anatomy of the BBC, part 3.

Issue 4, April 1-8.
Pro-Tests: Pied Piper Communicator, Olivetti ESW3000 printer, Namal Supertalker, Commodore Calcresult, Spectrum Pascal, Cashbook (BBC).
Gameplay: Dark Crystal (Apple II), St George (Dragon), Wizard War (Dragon).
ProgramCards: Fruit Machine (C64), Trader (Oric), Array Editor.
Databases: peripherals.
Clubnet: Clubs and user groups.
Micropedia: Go Forth, part 1.

Issue 5, April 8-15.
Pro-Tests: Commodore 700, Ikon Hobbit, I-2-3 (IBM), ZX81 machine code.
Features: speech packs, monitors.
Gameplay: Grand Prix (Dragon), Derby Day (Spectrum), Deadline (Apple).
ProgramCards: Wacky Racers (Oric), Fruit Machine (C64), Parse Integer.
Databases: Software.
Clubnet: full list of user groups.
Micropedia: Go Forth, part 2.

Issue 6, April 15-22.
Pro-Tests: Tycom Microframe, IBM PC, Scorpio Disks, Dragon sound module, ZX81 graphics, Bottom Line Strategist (CP/M), PaperClip word processor.
Features: IBM PC DOS, BBC word processing, PC-1251.
Gameplay: Mined Out (Spectrum), Transylvanian Tower (Spectrum), Lunar Leeper (Apple II), Evolution (Apple II).
ProgramCards: Wacky Racers (Oric), Mortgage Comparison (Sharp MZ80K), Computer Set Up (BBC), Day of Week.
Databases: micros.
Micropedia: Graphics, part 1.

Issue 7, April 22-29.
Pro-Tests: Mattel Aquarius, Epson FX80, Olivetti JP101, Lisp on Spectrum, Vic 20 assembler, Supergraf on Victor/Sirius.
Features: Dealer support, Atari graphics.
Gameplay: Krakit (ZX81), Cruising On Broadway (Spectrum), Kaktus (Vic 20), Fantastic Voyage (ZX81).
ProgramCards: CBM controls, Computer Set Up (BBC), Wacky Racers (Oric), Julian Dates.
Databases: Peripherals.
Micropedia: Graphics part 2.

Issue 8, April 29-May 6.
Pro-Tests: Atari Home Files Manager, Kobra Visi Star for the Vic 20, Hestacrest's Accounts for the Spectrum; Epson RX80 printer. NCR's Decision Mate V. Future Computer's FX20.
Features: Micronet, Compact programming on the TI99/4A.
Gameplay: Harvester (Vic 20), Strategea Command (Dragon 32), A first Book of Micro Rhymes (BBC), Telling the Time/Money (Spectrum).
ProgramCards: Program Indexer (BBC B), CBM Database cards 1-4, Sort/Extract.
Databases: software.

Issue 9, May 6-13.
Pro-Tests: Textured Basic on the Apple, Pixel Power on the Vic 20; Star DP510 printer, Dams and Interpod interfaces for Commodore 64; Micro-Professor.
Features: BBC function keys, Atari word-processing part 1.
Gameplay: Dungeons of Intrigue (Oric), The Castle (Oric), Starship Command (BBC B), Dragon Trek, Nowotnik Puzzle (Spectrum).
ProgramCards: Lunar case (Dragon 32), CBM database cards 5-6, Monster (Spectrum), Wildcard Search (Model A).
Databases: hardware.
Micropedia: Graphics. part 4.

Issue 10, May 13-20.
Pro-Tests: Assembler on Commodore 64, Dragon Mace; MC202 and EM1300 music synthesisers (Apple), Prism directly coupled modem; Epson QX10.
Features: ZX81 graphics part 1; Atari word-processing part 2.
Gameplay: Rescue (Spectrum), Dictator (Spectrum), Roman Empire (Spectrum), Choplifter (Vic 20), Skyhawk (Vic 20).
ProgramCards: Union Jack (Lynx), Escape (Spectrum), CBM Database cards 7-9, Evaluate (MBasic), Formula (BBC B).
Databases: peripherals.
Micropedia: Graphics, part 5.

Issue 11, May 20-26.
Pro-Tests: BBC Vufile, PFS:File for IBM, Apple Pascal, printer comparison, Prikard Joystick Controller for ZX81 and Spectrum; CWE Computer Master.
Features: ZX81 graphics part 2, Basic on the Sharp MZ80K.
Gameplay: Motor Mania (Commodore 64), Oric Flight, BBC Music Synthesiser, Music Maker (Spectrum), Embassy Assault (Spectrum), Tobor (Spectrum).
ProgramCards: Homeward Bound (ZX81), Connect Four (Dragon 32), CBM Database, cards 10 — end.
Micropedia: Keyboards.

Issue 12, May 27-June 2.
Pro-Tests: Spectrum word processor, PFS:Report on IBM, File Handling for Colour Genie; CTI CP80 type 1 printer, TG Trackball; Sord M5.
Features: Epson Basic, Oric sound part 1, Dragon Colour graphics.
Gameplay: Mad Martha (Spectrum), Frenzy (Spectrum), Headbanger (Spectrum), Oric roundup.
ProgramCards: Election Barchart (Commodore 64), Memory Utility (BBC B), Munch (Spectrum).
Databases: Hardware.
Clubnet: clubs (Cambridge Microcomputer Club special).
Micropedia: Disk Drives, part 1.

Issue 13, June 3-9.
Pro-Tests: Telewriter for Dragon 32, Abersoft Forth for Spectrum, GPS graphics processing system for Apple II+; joysticks, rulers, Ajile.
Features: Dragon meets Tandy, Oric music part 2, transferring Basic for Colour Genie and Genie 1.
Gameplay: Everest Ascent (Spectrum), Colour Genie roundup, Micro Maze (Jupiter Ace), Oix (Atari).
ProgramCards: Cupid (Oric), Alien (Dragon 32), Time Bomb (Atari).
Databases: peripherals.

Issue 14, June 10-June 15.
Pro-Tests: Apple Accelerator II board, Modula-2 (Apple II), Oric Base, Joystick Control Unit J6, Kempston Centronics Interface. BBC Speech Synthesiser.
Features: Newbrain Basic part 1. Sirius designing.
Gameplay: Ah Diddums (Spectrum), Monopole (Commodore 64), Automonopoli (Spectrum), Dragon dramatics.
ProgramCards: Time Bomb (Atari, cont), Sheep Drive (BBC B).
Databases: Software.
Micropedia: Spectrum. Part 1

Issue 15, June 16-June 22.
Pro-Test: Comx 35, Address Management (Spectrum), Systrs (Commodore 64), MST Database (Epson HX-20), Voice Input Module (Apple II).
Features: Newbrain Basic part 2. Genie scene.
Gameplay: Cleared for Landing, Playing the Ace (Apple II), Vultures, Star Jammer (Dragon 32).
Programs: Mover (BBC B), Sprite Clock (Commodore 64), Pirate Island (Atari, 3 of 9), Micro-minder (Colour Genie), Brickbat (Dragon 32).
Databases: Hardware.
Micropedia: Spectrum. part 2.

Issue 16, June 23-June 29.
Pro-Tests: Atari v Acorn, word processing for the Commodore 64, Simplifile (CP/M), MPF-II printer, Z80 Pack for BBC.
Features: ZX81 Maths, US mail order, Atari graphics.
Gameplay: Computer Scrabble (Spectrum), Education (BBC), Horace and Spiders (Spectrum), Catcha Snatcha (Vic 20).
ProgramCards: Video Titler (TI99/4A 3 of 6), Bowling (Spectrum), Pirate Island (Atari cont).
Micropedia: Spectrum. part 3.

Issue 17, June 30-July 6.
Pro-Tests: Duet-16, The Organizer (CP/M), Tractor and Cut/Text (Spectrum), Juki 6100 daisywheel, Video Ultra Term (Apple II).
Features: Leasing part 1, Atari screen action.
Gameplay: Oric chess, Grand Master (Commodore 64), Escape from Orion (BBC), Jet Pac (Spectrum), The Ring of Darkness (Dragon 32), Spectrum spectacle.
Programs: Video Titler (TI99/4A cont), Pirate Island (Atari cont) Word processor (BBC).

Micropedia: Sound, part 1.

Issue 18, July 7-July 13
Pro-Tests: Tandy 100, RS232 interface (ZX81), ROM pager (Commodore), Interface printer buffer. IBM Personal Basic, Spectrum assembler, Newbrain WP.
Features: Leasing Part 2, Lynx music.
Gameplay: Spectrum Backgammon, BBC Snooker, Commodore 64 round-up, Serpentine (Vic 20), Past (Spectrum), Spectrum Safari.
ProgramCards: Word Processor (BBC), Fruit Machine (Spectrum).
Micropedia: Sound Part 2.

Issue 19, July 14-July 20
Pro-Tests: 16-bit chips, Stock control (Epson HX20), Mailplus (Torch), Smith-Corona daisywheel, ZX81 word processing.
Features: Insurance, buying secondhand.
Gameplay: Escape MCP (C64), Escape from Perilous (Atari), Apple round-up, Temple of Apshai (C64), Airline (Spectrum), Heathrow (Spectrum).
ProgramCards: Colour Code (Atari), Wreck (Dragon).
Micropedia: Sound, part 3.

Issue 20, July 21-July 27
Pro-Tests: Rade bareboard. Vic digital tape drive, Seikosha colour printer, Toolkit (Spectrum), Bonus (Pet payroll), Newbrain monitor.
Features: Computer art, Dragon scrolling.
Gameplay: Rabbit Trail (TI99/4a), Aztec Challenge (Atari, Vic 20, TI99/4a), BBC round-up, Joust (Spectrum), Molar Maul (Spectrum), Print Shop (Spectrum), Time-Lords (BBC).
ProgramCards: Tumbler (Oric), Wreck (Dragon), Atari Errors, Speed Race (Vic 20).
Micropedia: Sound, part 4.

Issue 21, July 28-August 3.
Pro-Tests: BBC graphics, Newbrain assembler, BBC turtle, Oric printer, Triumph printer.
Gameplay: Franklin's Tomb (Dragon), Hummer House of Horror (Spectrum), Jumpman (64), Jumping Jack (Spectrum), Fourth Encounter (Vic), Cyclons (64).
ProgramCards: Collection (Vic), Bomber (64), Definer (BBC).
Micropedia: Sound, part 5.

Issue 22, August 4-August 10.
Pro-Tests: Spectrum Forth, BBC graphics, Music synthesisers, IBM plotter, Brother daisywheel, Malcron keyboard, Mupid.
Features: Genie assembler, Dragon machine code.
Gameplay: River Rescue, Orc Attack (Atari), Zork (64). Knot in 3D, 3D Combat Zone (Spectrum), Moria (Oric), Velnor's Lair (Spectrum).
Micropedia: CP/M part 1.

Issue 23, August 11-August 17.
Pro-Tests: Sord Basic-G, Tasword, BBC microfloppies, Microdrive, Tandy Model 4.
Features: Dragon machine code, Atari controllers.
Gameplay: Bridge Master, Styx, Manic Miner (Spectrum), Atari roundup, Candy Floss/Hangman (Oric), Everest (Dragon).
Micropedia: CP/M. part 2.

Issue 24, August 18-August 24.
Pro-Tests: T-Maker III, Spectrum Fifth, daisywheels surveyed, Spectrum digital tracer, Laser.
Features: Videotex, Dragon machine code.
Gameplay: Oric roundup, Cookie, Egg Farm, Sadom (Spectrum), Sea Lord (BBC), Lusitanic (Dragon), The Island (64).
Micropedia: Commodore 64. part 1.

Issue 25, August 25-August 31.
Pro-Tests: Electron, Simons Basic. Oric monitors, Microdrive.
Features: Newbrain map, Acorn Atom, Dragon machine code.
Gameplay: Suspended (64), Terror Daktils, Tranz AM (Spectrum), Dragon roundup, Jogger (Oric), Frogger (IBM).
Micropedia: Commodore 64.

Issue 26, September 1-September 7.
Pro-Tests: Microtan 65, BCPL, BBC tracer, 80 column Pet, Oric interfaces.
Gameplay: Magic Mountain, Smugglers Cove (Spectrum). Spectrum roundup, Matrix). (64), Ninja Warrior (Dragon), Dallas. (Oric), Call to Arms (IBM).
Micropedia: Commodore 64.

Issue 27, September 8-September 14.
Pro-Tests: Sharp MZ700, BBC Lisp, Apple editor, IBM mice, ZX81 surgery.
Gameplay: Zip-Zap, Zzoom (Spectrum), Spectrum roundup, Hoover Bower, Benji-Space Rescue (64).
Micropedia: Dragon. part 1.

Issue 28, September 15-September 21.
Pro-Tests: Zenith Z100, Snail Logo, Atari Supergraphics, Newbrain CP/M, IBM mice.
Gameplay: The Witness, Super Scramble, Stix (64), Harrier Attack (Oric), Morocco Grand Prix (Dragon), Pharoah's Tomb (Spectrum.
Micropedia: Dragon. part 2.

Issue 29, September 22-September 28
Pro-Tests: Portico Miracle, Dragon editor, BBC toolkit, Dragon drives, Apple light pen.
Features: HX20 disassembles, TI transformations.
Gameplay: Gridder, Gloopert, California Gold Rush (64), Oric roundup, Bomb Alley (BBC), Splat, General Election (Spectrum).
Micropedia: Dragon. part 3.

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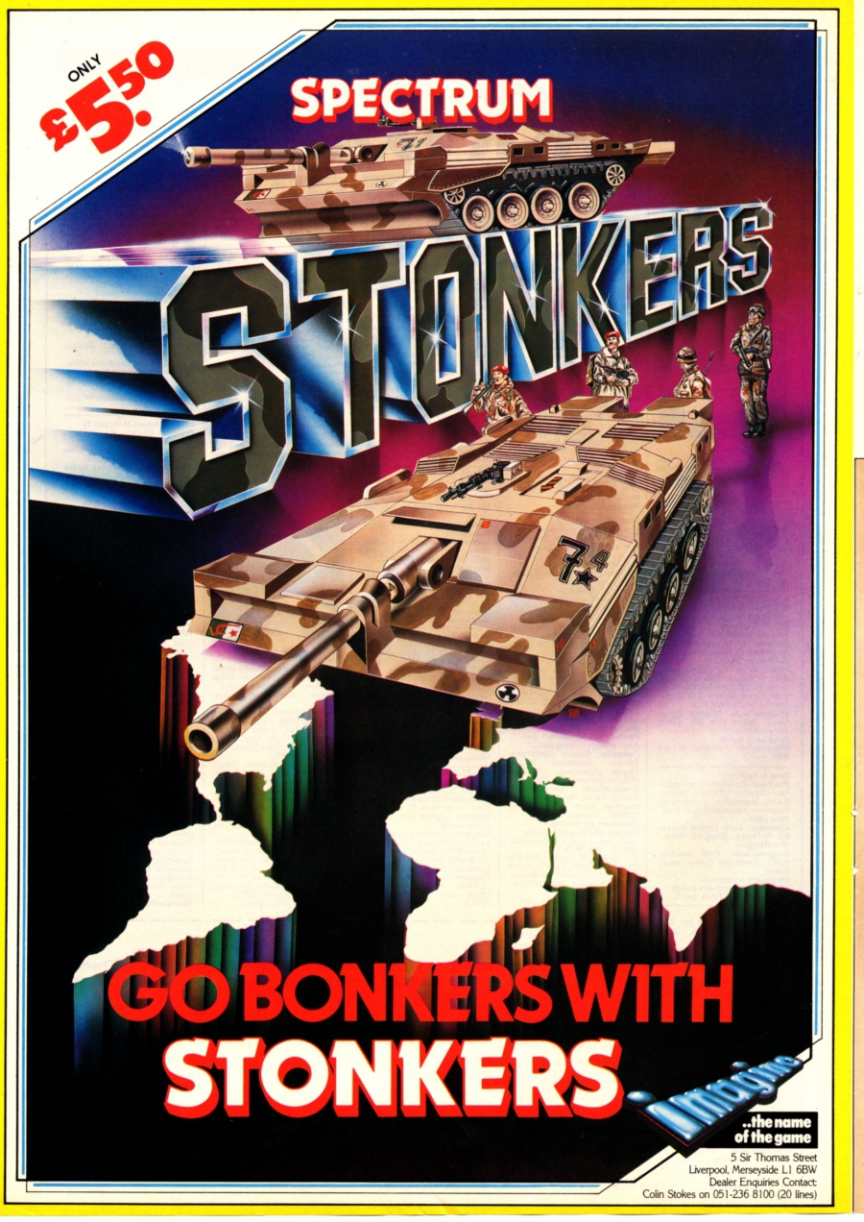
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Here it is — the final part of Darren Eteo's machine code game.

End of the tunnel

And now for what you have been waiting for. This week we present the final instalment of Darren Eteo's SS Ram machine code scramble-type game for the Dragon.

As it's a very long program, don't expect to get it running first time. You're bound to have made a mistake somewhere along the line.

Once you've got it all typed in you should be able to get it running, but remember to SAVE the program first, just in case you've made a typing mistake otherwise you may find yourself having to enter the whole lot again.

Perhaps you now realise why program authors expect a reasonable return for their efforts.

The game resides at &H6000 onwards, and its executable address is &H6097. Type EXEC &H6097 to run the program.

If you've missed any of the instalments, you can get back issues from the *PCN* Back Issues Service, 53-55 Frith Street, London W1A 2HG. The game was published in issues 38, 39, 40 and 41.

Bug fixes

Considering the length of the program, it's inevitable that there'll be a number of people who'll have trouble getting it to work. If you've any queries on the program, please write to Dragon Scramble, *PCN*, Evelyn House, 62 Oxford Street, London W1A 2HG, and we'll send you a complete listing.

```
840 @RETURN2
850      LDY @PLAYER-12
850      LDA ,Y
850      LDB #12
850      LDX #@DUMP
850 @DO1
850      CMPA ,X+
850      BEQ @FOUNDIT1
850 @RET1
850      DECB
850      BNE @DO1
860 @CLEAR
860      LDX @PLAYER-10
860      LDA #&AA
860 @FORF2
860      STA ,X+
860      DEC @PLAYER-4
860      BNE @FORF2
860      RTS
870 @FOUNDIT
870      LEAX -1,X
870      LDA -2,X
870      CMPA -32,Y
870      BEQ @GOTIT
870      LDA 2,X
870      CMPA 32,Y
870      BEQ @GOTIT
870      LEAX 1,X
870      BRA @RETURN2
880 @GOTIT
880      SUBB #19
880      COMB
880      INCB
880      ANDB #&FE
880      LDA #16
880      MUL
880      COMB
880      COMA
880      ADDD #1
880      LEAY D,Y
880      LEAY -32,Y
880      LDA #10
880      STA @PLAYER-1
880      LDD #&AAAA
880 @REPEATR
880      STD ,Y
880      LEAY 32,Y
880      DEC @PLAYER-1
880      BNE @REPEATR
880      BRA @CLEAR
890 @FOUNDIT1
890      LEAX -1,X
890      LDA -2,X
890      CMPA -32,Y
890      BEQ @GOTIT1
890      LDA 2,X
890      CMPA 32,Y
890      BEQ @GOTIT1
890      LDA ,Y
890      BRA @RET1
900 @GOTIT1
900      SUBB #12
900      COMB
900      INCB
900      ANDB #&FE
900      LDA #16
900      MUL
900      COMB
900      COMA
900      ADDD #1
900      LEAY D,Y
900      LEAY -32,Y
900      LDA #8
900      STA @PLAYER-1
900      LDD #&AAAA
900 @REPEATF
900      STD ,Y
900      LEAY 32,Y
900      DEC @PLAYER-1
900      BNE @REPEATF
900      LDD @PLAYER-16
900      ADDD #15
900      STD @PLAYER-16
900      LDD #&0005
900      STD @USCORE+7
900      LBRA @CLEAR
910 @DBOMBS
910      LDD @PLAYER-16
910      SUBD #2
910      STD @PLAYER-16
910      LDA @TBOMB
910      CMPA #6
910      BLO @AOK
910      LDA #6
910      STA @TBOMB
910      RTS
910 @AOK
920      LDX @PLAYER-3
920      LEAX 415,X
920      LDY #@TBOMB+1
920      LDA @TBOMB
920      ADDA #2
920      STX A,Y
920      STA @TBOMB
920      LDX ,X
920      CMPX #&AAAA
920      BNE @HITSOM
920      RTS
930 @MBOMB
930      LDY #@TBOMB+2
930      LDA @TBOMB
930      BNE @OKL
930      RTS
930 @OKL
930      LDB A,Y
930      ANDB #31
930      CMPB #0
930      BHI @CONTIN
930      LDX #@TBOMB+1
930      LDB @TBOMB
930      LDX B,X
930      DECA
930      STX A,Y
930      INCA
930      SUBB #2
930      STB @TBOMB
930 @CONTIN
930      SUBA #2
930      BGT @OKL
940      LDA @TBOMB
940      BNE @OOKA
940      RTS
940 @OOKA
940      LDY #@TBOMB+1
940 @LOOPJ
940      LDX A,Y
940      LDU #&AAAA
940      LEAX -1,X
940      LDB #6
940      STB @PLAYER-1
940 @LOOPDU
940      STU ,X
940      LEAX -32,X
940      DEC @PLAYER-1
940      BNE @LOOPDU
940      LEAX 193,X
940      LEAX 127,X
940      STX A,Y
940      LDX ,X
940      CMPX #&AAAA
940      BEQ @POS
940      BSR @HITSOM
940      BRA @NOTPUT
940 @POS
950      PSHS A,Y
950      LDX A,Y
950      LDY #@PBOMB
950      LDA #6
950      STA @PLAYER-1
950 @LOOPFG
950      LDD ,Y++
950      STD ,X
950      LEAX -32,X
950      DEC @PLAYER-1
950      BNE @LOOPFG
960      PULS A,Y
960 @NOTPUT
960      SUBA #2
960      BGT @LOOPJ
960      RTS
970 @HITSOM
970      PSHS A,Y
970      LDB @TBOMB
970      LDX B,Y
970      LDU A,Y
970      STX A,Y
970      SUBB #2
970      STB @TBOMB
970      LDB #5
970      STB @PLAYER-1
970      LDD #&AAAA
970      LEAU -32,U
970 @LOOPU
970      STD ,U
970      LEAU -32,U
970      DEC @PLAYER-1
970      BNE @LOOPU
980      LEAU 192,U
980      STU @PLAYER-14
980      LDB @PLAYER-13
980      ANDB #31
980      STB @PLAYER-9
980      LDY #@MTABLE+1
980      LDA @MTABLE
980 @NEXTONE
980      LDX A,Y
980      CMPX @PLAYER-14
980      BHI @NOTTHIS
980      STX @PLAYER-12
980      LEAX 288,X
980      CMPX @PLAYER-14
980      BLO @NOTTHIS
980      LDB @PLAYER-11
980      ANDB #31
980      CMPB @PLAYER-9
980      INCB
980      BLO @NOTTHIS
990      SUBB #2
990      CMPB @PLAYER-9
990      BHI @NOTTHIS
990      LDB #9
990      STB @PLAYER-1
990      LDB @MTABLE
990      LDU B,Y
990      STU A,Y
990      SUBB #2
990      STB @MTABLE
990      LSRB
990      STB @MTABLE1
990      LDX @PLAYER-12
990 @BLANKIT
990      LDU #&AAAA
990      STU ,X
990      LEAX 32,X
990      DEC @PLAYER-1
990      BNE @BLANKIT
1000     LDD #&0200
1000     STD @USCORE+7
1010     LBRA @GOTITOK
1020 @NOTTHIS
1020     SUBA #2
1020     BGT @NEXTONE
1020     LDY #@THOMER+1
1020     LDA @THOMER
1030     LDU @PLAYER-14
1030 @NEXTONE1
1030     LDX A,Y
1030     CMPX @PLAYER-14
1030     BHI @NOTTHIS1
1030     STX @PLAYER-12
1030     LEAX 288,X
1030     CMPX @PLAYER-14
1030     BLO @NOTTHIS1
1030     LDB @PLAYER-11
1030     ANDB #31
1030     CMPB @PLAYER-9
1030     ADDB #2
1030     BLO @NOTTHIS1
1040     SUBB #3
1040     CMPB @PLAYER-9
1040     BHI @NOTTHIS1
1040     LDB #9
1040     STB @PLAYER-1
1040     LDB @THOMER
1040     LDU B,Y
1040     STU A,Y
1040     SUBB #2
1040     STB @THOMER
1040     LDX @PLAYER-12
1040 @BLANKIT1
1040     LDU #&AAAA
1040     STU ,X
1040     LEAX 32,X
1040     DEC @PLAYER-1
1040     BNE @BLANKIT1
1040     LDD #&0500
1040     STD @USCORE+7
1050     BRA @GOTITOK
1060 @NOTTHIS1
1060     SUBA #2
1060     BGT @NEXTONE1
1070     LDA #2
1070     STA @PLAYER-4
1070     LDX @PLAYER-14
1070 @TRYAGN1
1070     LDB #12
1070     STB @PLAYER-1
1070     LDA ,X
1070     CMPA #&55
1070     BEQ @STOP
1070
1070     LDY #@DUMP
1070 @TRYAGN
1070     CMPA ,Y+
1070     BEQ @CAUGHT
1070 @RT
1070     DEC @PLAYER-1
1070     BNE @TRYAGN
1070     LEAX 1,X
1070     DEC @PLAYER-4
1070     BNE @TRYAGN1
1070     BRA @GOTITOK
1080 @CAUGHT
1080     LDB 1SUBSOUND
1080     CMPB ,Y
1080     BEQ @GOTHI
1080     LDB 32,X
1080     CMPB 1,Y
1080     BEQ @GOTHI
1080     BRA @RT
1090 @GOTHI
1090     LDD @PLAYER-16
1090     ADDD #20
1090     STD @PLAYER-16
1090     LDD #&0005
1090     STD @USCORE+7
1100 @STOP
1110 @GOTITOK
1110     PULS A,Y
1110     RTS
1120 @FUEL
1120     LDA @PLAYER-16
1120     LBLT @LOST
1120     CMPA #&14
1120     BLO @CONT1
1120     LDD #&13FF
1120     STD @PLAYER-16
1120     RTS
1120 @CONT1
1120     CLRB
1120     LDX #&1DFF-149
1120     LEAX A,X
1120     STB ,X
1120     STB 32,X
1120     STB 64,X
1120     STB 96,X
1120     LDB #&55
1120     STB 1,X
1120     STB 33,X
1120     STB 65,X
1120     STB 97,X
1120     LDD @PLAYER-16
1120     SUBD #1
1120     STD @PLAYER-16
1120     RTS
1130 @UPSCORE
1130     LDY #@TSCORE
1130     LDU #&627
1130     LDA #10
1130     STA @PLAYER-1
1130 @NEXTA
1130     LDA ,Y+
1130     LDB #12
1130     MUL
1130     ADDD #@PSCORE
1130     TFR D,X
1130     LDA #6
1130     STA @PLAYER-4
1130 @UNTIL
1130     LDD ,X++
1130     STD ,U
1130     LEAU 32,U
1130     DEC @PLAYER-4
1130     BNE @UNTIL
1130     LEAU -190,U
1130     DEC @PLAYER-1
1130     BNE @NEXTA
1130     RTS
1140 @ASCORE
1150     LDY #@TSCORE+11
1150     LDX #@USCORE+11
1150     LDB #10
1150     CLRA
1150     CLR @PLAYER-1
1150 @UNTILD
1150     ADDA @PLAYER-1
1150     CLR @PLAYER-1
1150     ADDA ,-X
1150     ADDA ,-Y
1150     CMPA #9
1150     BLS @CON
1150     SUBA #10
1150     CLR @PLAYER-1
1150     INC @PLAYER-1
1150 @CON
1150     STA ,Y
1150     CLRA
1150     DECB
1150     BNE @UNTILD
1160     LDX #@USCORE+11
1160     LDB #10
1160 @LKJ
1160     CLR ,-X
1160     DECB
1160     BNE @LKJ
1160     RTS
1170     RTS
1170     END @START
```

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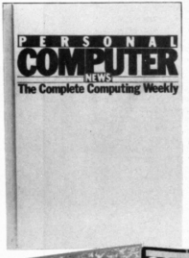

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HAPPY CHRISTMAS
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ALIEN SHIP!!
PREPARE TO
ATTACK!!

EIGHT BITS FOR XMAS

Merry Christmas, and welcome to the world of micro ownership.

This final supplement to our Micropaedia buyer's guide provides said silicon sustenance for your micro. Here are programs for eight popular micros with hints on conversion to other machines, so even if your new micro isn't one of the eight we've picked there's still a good chance you can convert the program to run on your machine.

If your experience of typing programs is limited to short programs or non-existant, fear not, for *PCN* will make it dead easy by giving you some insight into the art of program-tapping. It isn't quite *that* easy so a few rules should always be observed:

1. Always read the whole program through first, carefully noting its length and requirements. If a program uses joysticks and you don't have any, the program isn't of much use.

2. Think before you type. Understand as much of what the program is trying to do as you can.

Even the best computer publications can make printing errors — and unless you understand something about what's going on in the program, you won't spot those errors until you're told about them.

The simple instruction PRINT could cause havoc in a program if mispelled even once.

This is not to say that every time an error pops up you should blame it on whoever's given you the listing. Most computer magazines make it a policy to print out listings only from programs that have been fully tested and debugged. This means that any published listing is taken from information sent directly from the computer it has just RUN on — thereby minimising the chances of error.

Before you try and RUN a program typed in from a magazine, first (if you have the equipment to do so) print out what you've typed into your machine. In many Basics this involves simply putting the printer on-line and typing LLIST onto the computer).

If you don't have a printer the screen will have to do. The important thing is that you compare — character by character, line by line and subroutine by subroutine — what you've typed into your computer to the published program.

Once you're confident your typed version of the program tallies with what has been printed, the real debugging begins.

Debugging

Even if you've followed all the fules outlined above, you're still likely to have troubles when you try to RUN the program you've typed in so carefully.

You'll now have to begin the process known as *debugging*. This usually consists of repeated attempts to RUN the program after making changes that you hope will 'fix' it. In order to debug properly, you need to take a relatively systematic approach.

First try running the program — who knows, it may work the first time. If it doesn't work, you'll get what's known as an *Error message* telling you there's a problem of some description on a given line. Such messages usually take the form:

Bad dim at line xxx

which, translated in English, means that you have dimensioned an array incorrectly at Line xxx.

Other common messages include:

Syntax Error — This is probably the most common — and perhaps most infuriating — error message you could get. It usually gives you the line number at which the error occurred and usually points to some sort of spelling mistake (but usually is the operative word).

No such variable — means you either mistyped a Basic keyword so that the computer thinks you're talking about an undefined variable *or* that you tried to refer to a variable that's undefined. In some versions of Basic the computer will automatically assign a zero value to any variables you leave undefined. If that's the case you might also get a *Division by Zero* error if that variable that you have failed to define is involved in any division.

NEXT *without* FOR — means that you have tried to develop a FOR...NEXT loop without putting the NEXT statement at the end of the loop. This error can also occur if your FOR...NEXT loops aren't 'nested' within one another.

Out of DATA — means you are missing a data item in a series of in a DATA statement. These statements are usually associated with a READ statement which precedes them.

Illegal quantity — this usually means you've tried to give the computer a value for a certain function, and the value that you've assigned exceeds the values allowed.

With this list (by no means comprehensive) you should have some idea of some of the common error messages and what they do. The user guide to your machine should contain a more complete list, and explanations.

On some computers — like Sinclair's ZX81 and Spectrum — you won't always get as far as these messages because they have what is know as 'automatic error-trapping'. This means that syntax errors are automatically spotted as you type the program. And, because the Sinclairs use single-keyword entry, it's very difficult to incorrectly type a Basic keyword into the machine.

Defend

Yet again the Earth is under attack from the alien hordes, and as always the fate of humanity is in your hands.

This time the aggressors are out to capture humanoids for their debauched cloning experiments, and the ever-cooperative have gathered on the (randomly-generated) hillsides to watch the action. So it's all down to you. You must shoot down the alien craft with your powerful laser before it can lay its claws on the populace.

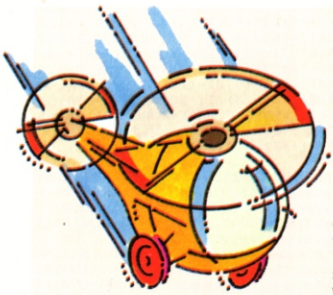
Failing that, you have a chance of shooting it down once it has the human in tow.

And never forget, aliens invariably bite back!

From the Pan/Personal Computer News Computer Book Library: *Sixty Programs for the Dragon 32* by Robert Erskine, Humphrey Walwyn, Paul Stanley and Michael Bews.

```
100 'DEFEND BY PAUL STANLEY                REW
RITTEN FOR THE DRAGON 32        BY E.A.JACK
SON
105 CLEAR 500:DIM B(39),R(32),S(32),T(24
),U(24),V(24),W(48),X(48),H1(255),V1(255)
110 GOSUB 395
115 H1=0:GOSUB 645:GOSUB425:GOSUB 410
120 SCORE=0:J1=0:J2=0:GOSUB575
125 D1=100:D2=46:SCREEN 1,0
130 TIMER=1000:CAP=0:GOSUB 510:GOSUB 485
:GOSUB535:GOSUB555
135 MARK=0
140 A1=220:A2=28
145 GOTO 280
150 IF MARK=99 THEN 355
155 IF CAP=3 OR FUEL =0 THEN 440
160 IF MARK=99 THEN 135
165 GOTO 145
170 'MOVE DEFENDER 1
175 IF D$=CHR$(8)THEN 225
180 COLOR 2,3:A$=INKEY$
185 IF A$=CHR$(32) THEN 210
190 IF A$=CHR$(10) OR A$=CHR$(94) THEN B
$=A$
195 IF A$=CHR$(8) THEN D$=A$:GOTO 170
200 D2=D2+8*(B$=CHR$(94) AND D2>26)-8*(B
$=CHR$(10) AND D2<60)
205 PUT(D1,D2)-(D1+39,D2+32),R,PSET:RETU
RN
210 LINE(D1+39,D2+16)-(220,D2+46),PSET:L
INE(D1+39,D2+16)-(220,D2+30),PSET:LINE(D
1+39,D2+16)-(220,D2+46),PRESET:LINE(D1+3
9,D2+16)-(220,D2+30),PRESET:SOUND 125,1:
TIMER=TIMER+100
215 IF A1+16>D1+39 AND A1<200 AND A2+15>
D2 AND A2+15<D2+30 THEN SCORE =SCORE+25:
TIMER=TIMER-500:GOSUB535
220 GOSUB485:RETURN
225 'DEFENDER 2
230 IF B$=CHR$(9) THEN 170
235 COLOR 2,3:A$=INKEY$
240 IF A$=CHR$(32) THEN 265
245 IF A$=CHR$(9) THEN D$=A$:GOTO 170
250 IF A$=CHR$(10) OR A$=CHR$(94) THEN B
$=A$
255 D2=D2+8*(B$=CHR$(94) AND D2>26)-8*(B
$=CHR$(10) AND D2<60)
260 PUT(D1,D2)-(D1+39,D2+32),S,PSET:RETU
RN
265 LINE(D1,D2+16)-(35,D2+46),PSET:LINE(
D1,D2+16)-(35,D2+30),PSET:LINE(D1,D2+16)
-(35,D2+46),PRESET:LINE(D1,D2+16)-(35,D2
+30),PRESET:SOUND 125,1:TIMER=TIMER+100
270 IF A1+30<D1 AND A2>D2+20 AND A2+15<D
2+46 THEN SCORE=SCORE+25:HIT=1:TIMER=TIM
ER-500:GOSUB535:GOTO 360
275 GOSUB485:RETURN
280 'ANDROID 1
285 COLOR 1,3
290 IF A1<1  THEN RETURN
295 A1=A1-10:A2=A2+8:IF A2>90 THEN A2=90
300 PUT (A1,A2)-(A1+27,A2+23),T,PSET
305 GOSUB 170
310 IF A2>50 AND A2<70 THEN 320
315 IF H1(A1)=1 THEN 335ELSE 325
320 LINE (A1,A2+8)-(A1-70,A2+8),PSET:LIN
E(A1,A2+8)-(A1-70,A2+8),PRESET:SOUND 120
,1:IF ABS(D2-(A2-8))<4 THEN TIMER=TIMER+
750:GOSUB485325 IF A2=90 THEN LINE(A1+8,
A2)-(A1+8,A2-30),PSET:LINE(A1+8,A2)-(A1+
8,A2-30),PRESET:SOUND 170,1:IF PPOINT(A1
+8,A2-34)<>3 THEN TIMER=TIMER+200:GOSUB4
85
330 GOTO 150
335 IF A2>V1(A1)-45 THEN 345
340 A2=A2+4:IF A2<V1(A1) THEN PUT(A1,A2)
-(A1+27,A2+23),T,PSET:GOTO 335
345 H2=A1:H3=V1(A1)-19:PUT (A1,A2-4)-(A1
+31,A2+44),W,PSET:MARK=99:H1(A1)=0:GOTO
150
350 GOTO 340
355 'ANDROID2
360 IF HIT=1 THEN PUT(A1,A2)-(A1+31,A2+4
8),X,PSET:PUT(H2,H3)-(H2+19,H3+19),V,PSE
T:HIT=0:H1(H2)=1:CAP=CAP-1:MARK=99:GOSUB
485:GOSUB510:GOTO160
365 A1=A1-10:IF A1<1 THEN A1=1:GOTO 390
370 LINE(A1+26,A2+4)-(A1+56,A2-38),PSET:
LINE(A1+26,A2+4)-(A1+56,A2-38),PRESET:SO
UND 170,1:IF D2>26 AND A1>50 AND A1<80TH
EN TIMER=TIMER+200:GOSUB485
375 GOSUB 170
380 A2=A2-8:IF A2<90 THEN A2=90
385 PUT(A1,A2)-(A1+31,A2+48),W,PSET:GOTO
365
390 PUT(A1,A2)-(A1+31,A2+48),X,PSET:CAP=
CAP+1:GOSUB 510:GOSUB485:GOTO135
395 'INSTRUCTIONS
400 CLS:PRINT@12,"DEFEND":PRINT "A FLEET
 OF ALIENS HAVE BROKEN  THROUGH EARTH'S
 OUTER DEFENCES. ONE BY ONE THEY FLY IN
WITH THE SOLE INTENT OF PICKING UP
 HUMANOIDS WHO WHO HAVE CLIMBED  TO THE
HILL TOPS TO SEE WHAT IS HAPPENING.":PRI
NT:
405 PRINT"YOUR JOB IS TO PREVENT THE FLE
ETFROM CAPTURING THE HUMANOIDS.":PRINT "
YOUR ONLY WEAPON IS A LASER SHIPWITH ONL
Y A SHORT RANGE AND     LIMITED MANOUVRA
BILITY":RETURN
410 CLS:PRINT"USE THE ARROW KEYS FOR DIR
ECTIONAND THE SPACEBAR TO FIRE.":PRINT "
THE GAME WILL END IF THREE      HUMANOID
S ARE CAPTURED OR IF YOURUN OUT OF FUEL."
415 GOSUB 425:RETURN
420 GOTO 420
425 PRINT@484,"PRESS SPACEBAR";
430 A$=INKEY$:IF A$<>CHR$(32)THEN 430
```

```
435 RETURN
440 'END PLAY
445 DRAW "C2;BM86,100"+ST$(5):FOR T=1TO1
000:NEXT T
450 B$=INKEY$
455 DRAW "C2;BM60,120"+ST$(6)
460 DRAW "C2;BM116,120"+ST$(7)
465 GOSUB485:GOSUB510:GOSUB535:GOSUB555
470 A$=INKEY$:IF A$<>CHR$(32) THEN 470
475 IF SCORE>HI THEN HI=SCORE
480 GOTO 120
485 'RECORD FUEL
490 FUEL=1000-INT(TIMER/10):IF FUEL<1 TH
EN FUEL=0
495 DRAW "C4;BM 52,184"+SF$:SF$="":SC$=S
TR$(FUEL)
500 FOR Z2=2TOLEN(SC$):Y2(Z2)=VAL(MID$(S
C$,Z2,1)):SF$=SF$+SN$(Y2(Z2)):NEXT Z2
505 DRAW "C2;BM52,184"+SF$:RETURN
510 'RECORD CAPTIVES
515 IF CAP<1 THEN CAP=0
520 DRAW"C4;BM206,184"+SP$:SP$="": SC$=S
TR$(CAP)
525 FOR Z2=2TO LEN(SC$):Y2(Z2)=VAL(MID$(
SC$,Z2,1)):SP$=SP$+SN$(Y2(Z2)):NEXT Z2
530 DRAW "C2;BM206,184"+SP$:RETURN
535 'RECORD NEW SCORE
540 DRAW"C3;BM60,14"+SS$:SS$="":SC$=STR$
(SCORE)
545 FOR Z2=2TOLEN(SC$):Y2(Z2)=VAL(MID$(S
C$,Z2,1)):SS$=SS$+SN$(Y2(Z2)):NEXT Z2
550 DRAW"C2;BM60,14"+SS$:RETURN
555 'RECORD HIGH SCORE
560 DRAW"C3;BM196,14"+SH$:SH$="":SC$=STR
$(HI)
565 FOR Z2=2TOLEN(SC$):Y2(Z2)=VAL(MID$(S
C$,Z2,1)):SH$=SH$+SN$(Y2(Z2)):NEXT Z2
570 DRAW"C2;BM196,14"+SH$:RETURN
575 'SCREEN DISPLAY
580 PMODE 3,1:PCLS3
585 DRAW "C3;BM0,0;R255;D20;L255;U20":PA
INT(2,2),3,3
590 DRAW "C2;BM2,14"+ST$(1)
595 DRAW "C2;BM122,14"+ST$(2)+ST$(1)
600 COLOR 0,3:FOR N=0TO255 STEP 30:V1(N)
=170-RND(15):NEXT N
605 IF J1>=255 THEN 620
610 J2=J1+30:IF J2>255 THEN J2=255:V1(25
5)=150
615 LINE(J1,V1(J1))-(J2,V1(J2)),PSET:J1=
J2:GOTO 605
620 PAINT(0,191),4,4
625 FOR N=0TO230 STEP60:H1(N)=1:PUT(N,(V
1(N)-19))-(N+19,V1(N)),V,PSET:NEXT N
630 DRAW "C2;BM4,184"+ST$(4):DRAW"C2;BM1
24,184"+ST$(3)
635 RETURN
640 RETURN
645 FOR N=1TO7:READ ST$(N):NEXT N:FOR N=
0TO9:READ SN$(N):NEXT N
650 PMODE 3,1:PCLS3
655 FOR A=0TO38:READB(A):NEXT A:FOR A=0T
012:C=1793+(A*32):POKE C,B(A):POKE C+1,B
(A+13):POKE C+2,B(A+26):NEXT A:GET(0,0)-
(39,32),R,G
660 FOR A=0TO38:READ B(A):NEXTA:FOR A=0T
012:C=1793+(A*32):POKE C,B(A):POKE C+1,B
(A+13):POKE C+2,B(A+26):NEXT A:GET(0,0)-
(39,32),S,G:PCLS3
665 FOR A=0TO31:READ B(A):NEXTA:FOR A=0T
015:C=1793+(A*32):POKE C,B(A):POKE C+1,B
(A+16):NEXT A:GET(4,0)-(31,23),T,G
670 FORA=0TO31:READ B(A):NEXT A:FOR A=0T
015:C=2113+(A*32):POKE C,B(A):POKE C+1,B
(A+16):NEXT A:GET(4,0)-(27,35),U,G:PCLS3
675 FOR A=0TO31:READ B(A):NEXTA:FOR A=0T
015:C=1601+(A*32):POKE C,B(A):POKE C+1,B
(A+16):NEXT A:GET(4,0)-(23,19),V,G:PCLS3
680 PUT(4,0)-(31,23),T,PSET:FOR A=0TO15:
C=2337+(A*32):POKE C,B(A):POKE C+1,B(A+1
6):NEXT A:GET(0,0)-(31,48),W,G:PCLS3
685 GET(0,0)-(31,48),X,G:RETURN
690 GOTO 690
700 DATA"BR2;NU1;R6;U4;L6;U4;R6;ND1;BD8;
BR10;NU1;L6;U6;R6;ND1;BD6;BR4;U6;R6;D6;N
L6;BR4;U6;R4;ND1;BD6;BR4;BR6;NU1;L6;U3;N
R6;U3;R6;D3;BD3;BR4","U4;NU4;R6;NU4;D4;B
R4;U4;BU2;U1;BD7;BR8"
705 DATA"BR4;NU1;L6;U6;R6;ND1;BD6;BR4;NU
3;R6;U3;NL6;U3;L6;ND1;BD6;BR10;ND4;U6;R6
;D6;NL6;BR4;BR4;NU1;L4;U6;NR2;NU4;BR4;BD
6;BR4;NU6;R6;NU6;BR4;U6;R4;ND1;BD6;BR4;B
U3;R6;U3;L6;D6;R6;NU1;BR4;NU6;R6;U6;NL6;
U4;BD10;BR4"
710 DATA "BR4;U6;NR4;U4;R6;ND1;BD10;BR2;
NU6;R6;NU6;BR4;BU3;R6;U3;L6;D6;R6;NU1;BR
4;NU10;R2"
715 DATA"NR4;U6;R6;D6;NL6;D3;L6;NU1;BR6;
BU3;BR4;NR4;NU3;R6;U3;NL6;U3;L6;D1;BD5;B
R10;U6;R4;ND6;R4;D6;BR4;U6;R6;D3;L6;D3;R
6;NU1;BR10;NR6;U6;R6;D6;BR6;NU2;R2;U2;L4
;U4;BR6;D4;BD2;BR10;NU1;L6;U6;R6;D3;NL6;
BD3;BR4;U6;R4;D1;BD5;BR4"
720 DATA "ND4;U6;R6;D6;L6;BR10;U6;R4;ND1
;BD6;BR4;BU3;R6;U3;L6;D6;R6;NU1;BR4;NU1;
R6;U3;L6;U3;R6;ND1;BD6;BR4;NU1;R6;U3;L6;
U3;R6;ND1;BD5;BR4"
725 DATA "NU1;R6;U3;L6;U3;R6;D1;BD5;BR4;
ND4;U6;R6;D6;L6;BR10;NU3;R6;U3;NL6;U3;L6
;D1;BD5;BR10;R6;U1;BU4;U1;L6;D6;BR10;U6;
R6;D3;L6;D3;R6;NU1;BR4;U6;NU4;R6;D6;L6;B
R10;NU3;R6;U3;NL6;U3;L6;D1;BD5;BR10;U6;R
4;ND1;BD6;BR4"
730 DATA "U6;R6;D6;NL6;BR4","R2;NR2;U6;N
L2;BD6;BR6","BU5;U1;R6;D3;L6;D3;R6;NU1;B
R4","NU1;R6;U3;NL3;U3;L6;ND1;BR10;BD6","
BR4;U2;NR2;NU2;L4;U4;BR6;BD6;BR4","NU1;R
6;U3;L6;U3;R6;BD6;BR4","BU3;R6;D3;L6;U6;
R6;ND1;BD6;BR4"
735 DATA "BU5;U1;R6;D6;BR4","R6;U3;NL6;U
3;L6;D6;BR10","R6;U6;L6;D3;R6;BD3;BR4"
740 DATA 170,170,90,86,149,165,165,165,1
49,86,90,170,170,170,170,149,127,95,87,8
5,85,85,85,149,170,170,170,170,170,106,9
0,214,85,86,90,106,170,170,170
745 DATA 170,170,170,169,165,151,85,149,
165,169,170,170,170,170,170,86,252,245,2
13,85,85,85,86,170,170,170,170,165,14
9,90,106,106,106,90,149,165,170,170
750 DATA 165,149,157,157,165,165,85,101,
101,101,101,154,154,154,151,106,90,2
18,218,106,106,86,102,102,102,102,154,15
4,154,154,90755 DATA 175,109,101,37,41,0
,128,160,160,165,160,160,162,162,162,150
,234,230,102,98,162,2,10,42,42,106,42,42
,42,42,42,90
760 DATA 175,109,101,229,233,255,191,175
,175,160,165,165,166,166,166,150,234,230
,102,110,174,254,250,234,234,42,106,106,
106,106,106,90
```



Heli-bomber

If you're fed up with games that have you whizzing around, you'll find it refreshing to return to Earth and struggle to cope with a fleet of helicopters whose pilots are committed to wiping out your fair city by foul means.

Thankfully you're in control of the metropolitan laser tower, and it's up to you to shoot down the bombs before they hit the city. You'll get points for every bomb you hit, and while you can wipe out a chopper if you feel so inclined, you won't add to your tally by this kind of agressive action.

You move your laser into sight with the Q, A, M and N keys. The game is over once one of the bombs finds a clear path to the ground or the laser tower itself is destroyed.

From the Pan/Personal Computer News Computer Book Library: Sixty Programs for the Commodore 64 by Robert Erskine, Humphrey Walwyn, Paul Stanley and Michael Bews.

```
    0 HS=0:POKE650,128:REM AUTO REPEAT O
N ALL KEYS.
   10 IFPEEK(53272)=21THENGOSUB9000
   20 DIMSD%(24,21):SL$="■■■■■■■■■■■■■■■■
"
   30 BD%=0:SC=0:HE=0:EN%=0:GOSUB20000
   40 POKE53280,0:POKE53281,0
   50 PRINT"■■■■■■■■ ■ DO YOU WANT INS
TRUCTIONS? (Y/N) "
   60 WAIT198,15:GETA$:IFA$="Y"THENGOTO6
3
   61 IFA$="N"THEN100
   62 GOTO60
   63 GOSUB10000
  100 GOSUB1000:GOSUB1150:GOSUB2270
  110 IFPEEK(198)>1THENPOKE198,1
  111 DX=0:DY=0:GETA$:GOSUB21000
  120 IFA$="Q"ORA$="●"THENDY=-1
  130 IFA$="A"ORA$="◆"THENDY=1
  140 IFA$="N"ORA$="╱"THENDX=-1
  150 IFA$="M"ORA$="╲"THENDX=1
  160 IFA$=" "ORA$=" "THENGOSUB1700
  170 GOSUB21000:GOSUB1200:GOSUB1300
  180 GOSUB21000:IFBD%=0ANDRND(1)>.85THE
NBD%=1:BX=HX:BY=HY+2
  190 IFBD%=1THENGOSUB1400:IFEN%=1THEN11
000
  200 PRINTLEFT$(SL$,18);SPC(19);PRINT"■
●"
  998 GOSUB21000:GOSUB1600
  999 GOTO110
 1000 REM *** BUILD TOWN
 1010 PRINT"■";FORN=0TO39
 1020 H=INT(RND(1)*5)+20
 1030 PRINTLEFT$(SL$,H);TAB(N);:PRINTMID
$(CL$,RND(1)*7+1,1);
 1040 FORX=HTO24
 1050 PRINTCHR$(165)"■■";:NEXT:NEXT
 1100 REM *** BUILD LASER TOWER
 1110 PRINTLEFT$(SL$,18);TAB(19);"■●■■";

 1120 FORX=1TO6:PRINT"×■■";:NEXT
 1130 RETURN
 1150 REM *** INITIALISE SIGHT POSITION
 1160 SX=19:SY=10
 1200 REM *** PRINT SIGHT
 1202 PRINTLEFT$(SL$,SY+1);SPC(SX);" ";
 1210 SY=SY+DY:SX=SX+DX
 1211 IFSX>39THENSX=0
 1212 IFSX<0THENSX=39
 1213 IFSY<2THENSY=17
 1214 IFSY>17THENSY=2
 1230 PRINTLEFT$(SL$,SY+1);SPC(SX);"■+";
RETURN
 1300 REM *** MOVE HELICOPTER
 1310 PRINTLEFT$(SL$,HY+1);SPC(HX-1);"
   "
 1320 HX=HX+INT(RND(1)*2)+1:IFHX>37THENH
X=1
 1330 HY=HY+INT(RND(1)*3)-1:IFHY>15THENH
Y=15
 1340 IFHY<2THENHY=2
 1350 PRINTLEFT$(SL$,HY+1);SPC(HX);"■■■■
";:FORQQ=1TO3
 1351 PRINTCHR$(160+QQ);:NEXT
 1360 RETURN
 1400 REM *** BOMB ON WAY !
 1410 PRINTLEFT$(SL$,BY+1);SPC(BX);" "
 1420 P=PEEK(1064+BX+(40*BY));IFP<>32AND
P<>43THEN1450
 1430 BY=BY+1:IFBY>23THENEN%=1:RETURN
 1440 PRINTLEFT$(SL$,BY+1);SPC(BX);"■";C
HR$(164);
 1441 POKE54284,241:POKE54283,17:POKE542
80,(30-BY)*8:RETURN
 1450 REM *** BOMB HIT SOMETHING !
 1451 POKE54296,0:POKE54283,0
 1460 IFP=81THENEN%=1
 1470 FORM=15TO0STEP-1:PRINTLEFT$(SL$,BY
+2);SPC(BX);CHR$(164);
 1480 PRINTLEFT$(SL$,BY+2);SPC(BX);" ";
 1481 POKE54296,M:POKE54284,15:POKE54280
,40:POKE54279,200:POKE54283,129:NEXT
 1490 BD%=0:POKE54283,0:RETURN
 1600 REM *** UPDATE SCORE LINE
 1610 PRINT"■■  SCORE =";SC;" HELICOPTER
S DESTROYED =";HE
 1620 RETURN
 1700 Y=18-SY:X=SX-19
 1701 FORV=15TO0STEP-1.5
 1702 POKE54296,V:POKE54284,15:POKE54280
,40:POKE54279,200:POKE54283,129:NEXT
 1703 POKE54283,0
 1710 IFX=0THEN1800
```

```
 1720 M=Y/X:FORY=16TO3STEP-1:HY%=Y
 1730 HX%=19+((18-HY%)/M):GOSUB2000
 1735 IFHX%<10RHX%>39THENY=2:GOTO1760
 1740 PRINTLEFT$(SL$,HY%+1);SPC(HX%);"■*
";
 1750 PRINTLEFT$(SL$,HY%+1);SPC(HX%);" "
;
 1760 NEXT:POKE198,0:RETURN
 1800 HX%=19:FORY=16TO3STEP-1:HY%=Y:GOSU
B2000:GOTO1740
 2000 REM *** HIT SOMETHING?
 2010 XV=PEEK(1024+HX%+(40*HY%))
 2020 IFXV=32ORXV=43THENRETURN
 2030 IFXV=97ORXV=98ORXV=99THEN2100
 2040 FORV=10TO1STEP-1:PRINTLEFT$(SL$,BY
+1);SPC(BX);"■▌ ";:GOSUB22000:NEXT
 2070 SC=SC+10:GOSUB1600:BD%=0:RETURN
 2100 REM *** HIT HELICOPTER
 2101 POKE54276,0:POKE54277,0:POKE54272,
0
 2102 POKE54276,33
 2120 PRINTLEFT$(SL$,HY+1);SPC(HX-1);"
 "
 2130 P=1023+HX+(40*(HY+2)):IFPEEK(P)<>3
2ANDPEEK(P)<>100ANDPEEK(P)<>43THEN2200
 2131 IFPEEK(P+1)<>32ANDPEEK(P+1)<>100AN
DPEEK(P+1)<>43THEN2200
 2132 IFPEEK(P+2)<>32ANDPEEK(P+2)<>100AN
DPEEK(P+2)<>43THEN2200
 2140 HY=HY+1:PRINTLEFT$(SL$,HY+1);SPC(H
X);"▙▟"
 2150 PRINTSPC(HX-1);"▐▄▌";:POKE54277,25
5:POKE54273,(30-HY)*8:GOTO2120
 2200 HE=HE+1
 2210 FORV=15TO8STEP-.5:GOSUB22000
 2220 PRINTLEFT$(SL$,HY+2);SPC(HX-1);"■*
**"
 2225 PRINTLEFT$(SL$,HY+2);SPC(HX-1);"▐\
|/"
 2230 NEXT:PRINTLEFT$(SL$,HY+2);SPC(HX-1
);"   ";POKE54283,0
 2240 PRINTLEFT$(SL$,HY+3);SPC(HX-1);"
 ";:GOSUB1600
 2270 HX=0:HY=INT(RND(1)*15)+2:GOTO1320
 9000 PRINT"■■■■■■■■■■■■■■  SETTING UP GRA
PHICS - PLEASE WAIT.    "
 9001 POKE56,48:POKE52,48:POKE1,55
 9002 GOSUB9500
 9003 Q=0:RESTORE
 9004 READA:IFA=-1THENRETURN
 9005 POKE13064+Q,A:Q=Q+1:GOTO9004
 9010 DATA0,192,112,63,15,3,0,0,1,31,60,
254,255,255,8,127
 9011 DATA128,240,136,108,252,248,34,252
,60,60,24,60,60,60,60,24
 9012 DATA255,153,255,153,255,153,255,15
3
 9499 DATA-1
 9500 CS=12288
 9510 POKE56334,PEEK(56334)AND254
 9520 POKE1,PEEK(1)AND251
 9530 FORI=CSTOCS+2047
 9540 POKEI,PEEK(53248+I-CS)
 9550 NEXTI
 9560 POKE1,PEEK(1)OR4
 9570 POKE56334,PEEK(56334)OR1
 9580 POKE53272,(PEEK(53272)AND240)+12
 9590 RETURN
10000 REM INSTRUCTIONS
10010 PRINT"■■        H E L I - B O M B E
R S !   "
10020 PRINT"   YOUR CITY IS BEING ATTACK
ED BY      HELICOPTER BOMBERS.
10030 PRINT"WHEN A BOMB HAS A CLEAR PATH
 THROUGH TO THE GROUND, OR WHEN YOUR";
10040 PRINT"LASER TOWER IS  DESTROYED, T
HE GAME ENDS."
10050 PRINT"MOVE YOUR LASER SIGHT USING
'Q' TO GO UP'A' TO GO DOWN, 'M' TO GO";
10060 PRINT" RIGHT AND 'N' TO GO LEFT. T
O FIRE YOUR LASER, PRESS"
10065 PRINT"THE SPACE BAR."
10070 PRINT"THE OBJECT OF THE GAME IS TO
 PROTECT THECITY BY SHOOTING DOWN THE";
10080 PRINT" BOMBS BEFORE  THEY REACH TH
E BUILDINGS."
10090 PRINT"■■■      ■ PRESS ANY KEY TO S
TART. "
10091 WAIT198,51:GETA$:RETURN
11000 REM END OF GAME...
11010 PRINT"■■■          ■ G A M E   O V
E R ! "
11020 PRINT"   A BOMB HAS PENETRATED YOU
R DEFENSES."
11030 PRINT"YOU DESTROYED "HE" HELICOPTE
RS, AND"
11040 PRINT"SCORED "SC" POINTS.■■"
11050 IFSC<=HSTHEN11080
11060 PRINT"       ■ THAT'S A NEW HIGH SC
ORE! "
11070 PRINT"THE OLD HIGH SCORE WAS "HS"
POINTS.":HS=SC
11080 PRINTSL$"    ■ DO YOU WANT TO PLAY
 AGAIN? (Y/N)";
11090 WAIT198,15:GETA$:IFA$="N"THENPOKE5
4296,0:END
11095 IFA$<>"Y"THEN11090
11096 GOTO30
20000 FORM=1TO10
20009 PRINT"■■■";FORN=1TO8:PRINTMID$(CL$
,N,1);"■     ■ H E L I - B O M B E R S !"
20010 NEXT:POKE53280,RND(1)*255:POKE5328
1,RND(1)*255:NEXT
20020 RETURN
21000 REM HELECOPTER SOUND
21001 POKE54276,0:POKE54277,0:POKE54272,
0
21002 POKE54276,129
21010 POKE54296,15:POKE54277,64
21020 POKE54273,10:POKE54272,255:POKE542
76,33:RETURN
22000 POKE54283,0
22001 POKE54296,V:POKE54284,15:POKE54280
,40:POKE54279,200:POKE54283,129
22002 RETURN
```

ORIC: SPECTRUM

The classic European confrontation, in a high-resolution graphics forest! It's just you and your challenger, and all just because he didn't return his joysticks! At least you can shoot first.

From the Pan/Personal Computer News Computer Book Library: Sixty Programs for the Oric-1 by Robert Erskine, Humphrey Walwyn, Paul Stanley and Michael Bews.


```
10 REM ******* D U E L ****    ©1983 MICHA
EL BEWS
15 REM ORIC CONVERSION BY ANDY GRANT
20 PAPER7:INK4:PRINTCHR$(17)CHR$(6):HIRES
25 DIM NT(8),TS(8),LT(8)
30 SH=0:W=0:DS=0:DS=0:MY=20
50 FOR Y=1TO:FOR X=0TO7:READA:POKE38912+(96
+Y)*8+X,A:NEXTX:NEXTY
60 FORX=0TO31:READA:POKE38912+(112*8)+X,A:
NEXTX
67 FORX=1TO8:READNT(X):READTS(X):READLT(X)
:NEXT
68 S#=" ":SH=STR$(SH):
SC#=STR$(SH)
70 M#="jk"+S#+"no"
75 N#="lm"+S#+"pq"
80 FORI=0TO31:FORK=1*7TO3#:SOUND1,K,15:PLAY
1,0,5,2500:NEXTK:NEXTI
85 FORX=5#TO15TEP-1:SOUND1,K,15:PLAY1,0,5,
2500:NEXTK:PLAY0,0,0,0
99 REM ** PRINT SCENE
100 P#=" D U E L    ©1983 ANDY GRANT "
101 CURSET2,3,2:FORX=1TOLEN(P#):CHAR(ASC(M
ID$(P#,X,1))),0,1:CURMOV7,0,3:NEXT
109 REM**PLOT TREES
110 GOSUB2300
120 FORX=8TO180STEP8:CURSET8,X,3:FILL8,1,1
8:NEXT
125 CURSET8,183,3:FILL8,1,28:CURSET8,191,3
:FILL8,1,23
130 P#=" DUELLIST:              OPPONENT:"
131 CURSET8,183,3:FORX=1TOLEN(P#):CHAR(ASC
(MID$(P#,X,1))),0,1:CURMOV7,0,3:NEXT
132 P#=" YOU ARE THE DUELLIST ON THE LEFT
"
133 CURSET8,191,3:FORX=1TOLEN(P#):CHAR(ASC
(MID$(P#,X,1))),0,1:CURMOV7,0,3:NEXT
135 FORX=1#TO199:POKE40968+40#X+1,4:NEXT
140 PRINT' TAKE ALTERNATE SHOTS WITH YOUR
"
141 PRINT' OPPONENT UNTIL ONE SCORES A HIT
"
142 PRINT' USE 'A&Z' TO AIM, 'N' TO FIRE'
!
145 CURSET148,8,3:FILL8,1,17:P#="SHOTS:  "
146 CURSET148,8,3:FORX=1TOLEN(P#):CHAR(ASC
(MID$(P#,X,1))),0,1:CURMOV7,0,3:NEXT
160 W#=" WINNER              WINNER"
165 FORX=1#TO17:POKE40968+40#X+1,12:NEXT
X
170 FORX=17#TO17:POKE40968+40#X+2,2:POKE4
0968+40#X+20,2:NEXTX
175 CURSET28,170,3:FORX=1TOLEN(W#):CHAR(AS
C(MID$(W#,X,1))),0,1:CURMOV7,0,0:NEXT
180 CURSET28,158,3:FORX=1TOLEN(M#):CHAR(AS
C(MID$(M#,X,1))),0,1:CURMOV6,0,3:NEXT
185 CURSET42,158,3:FORX=1TOLEN(N#):CHAR(AS
C(MID$(N#,X,1))),0,1:CURMOV6,0,3:NEXT
199 REM **MAIN GAME ROUTINE
200 GETA#:IFA#=""THENGOTO200
210 IFA#()"A" AND A#()"N" AND A#()"Z"THENG
OTO200
220 IFA#="A"THENMY=MY-1:GOTO300
230 IFA#="Z"THENMY=MY+1:GOTO300
240 IFA#()"N"THENGOTO200
242 CURSET204,0,3:FORX=2TOLEN(SH#)
243 CHAR(ASC(MID$(SH#,X,1))),0,1:CURMOV6,0
,0:NEXTX
245 SH#=SH+1:SH#=STR$(SH):CURSET264,0,3
246 FORX=2TOLEN(SH#):CHAR(ASC(MID$(SH#,X,1
))),0,1:CURMOV6,0,0:NEXTX
249 M=INT(MY/2)+10
250 CURSET53,154,3:DRAW149,-MY,1
255 SHOOT:WAIT10
260 CURSET53,154,3:DRAW149,-MY,0
265 IFMY(2#ANDMY>-2#THENW=1:GOTO500
270 GOTO400
280 IFMY(-28#THENMY=-28
310 IFMY>28#THENMY=28
330 GOTO200
399 REM**OPPONENT FIRE RETN
400 FORX=1TO100:NEXTX
401 Y=INT(RND(1)#58)-25
405 CURSET204,0,3:FORX=2TOLEN(SH#)
406 CHAR(ASC(MID$(SH#,X,1))),0,1:CURMOV6,0
,0:NEXTX
407 SH#=SH+1:SH#=STR$(SH):CURSET264,0,3
408 FORX=2TOLEN(SH#):CHAR(ASC(MID$(SH#,X,1
))),0,1:CURMOV6,0,3:NEXTX
410 CURSET174,154,3:DRAW-149,-Y,1
412 SHOOT:WAIT10
415 CURSET174,154,3:DRAW-149,-Y,0
420 CURSET174,154,3:DRAW-149,-Y,1
422 SHOOT:WAIT10
425 CURSET174,154,3:DRAW-149,-Y,0
430 IFY(3#ORY)-3THENGOTO500
448 GOTO200
499 REM****END OF GAME
500 IFW=1THENZ=77:SC#=STR$(DS)
501 IFW=0THENZ=228:SC#=STR$(CS)
505 CURSET2,163,3:FORX=2TOLEN(SC#)
506 CHAR(ASC(MID$(SC#,X,1))),0,1:CURMOV7,0
,0:NEXTX
507 IFW=1THENDS=DS+1:SC#=STR$(DS)
508 IFW=0THENCS=CS+1:SC#=STR$(CS)
509 CURSETZ,183,3
510 FORX=2TOLEN(SC#):CHAR(ASC(MID$(SC#,X,1
))),0,1:CURMOV7,0,0:NEXT
511 IFW=1THENFORX=17#TO17:POKE40968+40#X+
2,7:POKE40968+40#X+20,2:NEXTX
512 IFW=0THENFORX=17#TO17:POKE40968+40#X+
20,7:NEXTX
515 FORT=19#TO148STEP-1:SOUND1,TT,15:PLAY
1,0,5,2500:NEXTTT:FORM=1TO8
516 FORM=1TO8:MUSIC1,TS(M),NT(M),15:MUSIC2
,TS(M)-1,NT(M),15:PLAY3,0,5,2500
517 WAITLT(M)/2:PLAY0,0,0,0
518 IFM=2THENWAIT12
519 IFM=7THENWAIT25
520 NEXTM
525 SH=0:W=0:MY=MY+2
530 PRINT'
535 PRINT"       PRESS (RETURN)
"
540 CURSET204,0,3:FORX=2TOLEN(SH#)
541 CHAR(ASC(MID$(SH#,X,1))),0,0:CURMOV6,0
,0:NEXTX
545 GETK#
550 GOTO140
999 REM** TREE
1000 DATA1,1,7,7,38,31,63,15,7,63,63,63,63
,63,63,47,0,48,56,60,31,63,62,62
1001 DATA31,15,11,15,7,0,0,0,63,63,55,63,1
4,14,14,63,46,60,60,56,12,0,0
1002 DATA8,0,0,0,0,0,0,0,14,14,14,14,14,14
,14,14,2,2,33,10,35,43,48,0
1009 REM** DUELLIST
1010 DATA15,3,3,3,1,31,31,1,56,48,48,55,38
,56,60,32
1011 DATA3,3,3,2,2,2,2,3,48,48,48,16,16,16
,16,24
1019 REM** OPPONENT
1020 DATA7,3,3,59,25,23,15,1,60,48,48,48,3
2,60,60,32
1021 DATA3,3,3,2,2,2,2,6,48,48,48,16,16,16
,16,48
1029 REM ** TUNES
1030 DATA10,4,15,10,4,15,0,4,12,5,4,12,3,4
,12,1,4,12,10,10,10,5,15
1999 REM **PLOT TREES
2000 T#="abc":U#="def":V#="ghi"
2005 X=24:Y=16:GOSUB3000
2010 X=36:Y=24:GOSUB3000
2015 X=66:Y=32:GOSUB3000
2020 X=97:Y=16:GOSUB3000
2025 X=108:Y=24:GOSUB3000
2030 X=132:Y=32:GOSUB3000
2035 X=168:Y=48:GOSUB3000
2040 X=128:Y=56:GOSUB3000
2045 X=84:Y=56:GOSUB3000
2050 X=61:Y=48:GOSUB3000
2055 X=12:Y=56:GOSUB3000
2060 X=162:Y=88:GOSUB3000
2065 X=41:Y=96:GOSUB3000
2070 X=18:Y=112:GOSUB3000
2075 X=174:Y=112:GOSUB3000
2900 RETURN
3000 CURSETX,Y,3:FORI=1TO3:CHAR(ASC(MID$(T
#,I,1))),0,1:CURMOV6,0,0:NEXT
3010 CURSETX,Y+8,3:FORI=1TO3:CHAR(ASC(MID$
(U#,I,1))),0,1:CURMOV6,0,0:NEXT
3020 CURSETX,Y+16,3:FORI=1TO3:CHAR(ASC(MID
$(V#,I,1))),0,1:CURMOV6,0,0:NEXT
3030 RETURN
```

In the Buzzy Bee program you control a small bird which pecks away at the stems of a row of plants which are gradually growing towards the top of the screen. If any of the plants should reach the top, a bee will drop down and take the nectar and you have lost the game.

The bird can be moved from left to right by using the Z and X keys. The M key will cause the bird to peck, although none of the stems can be pecked twice in succession.

From the Pan/Personal Computer News Computer Book Library: Sixty Programs for the Sinclair ZX Spectrum by Robert Erskine, Humphrey Walwyn, Paul Stanley and Michael Bews.

```
 1 BORDER 0: PAPER 0: INK 7: CLS
 6 CLS
 7 GO SUB 9700
 8 GO SUB 9000
10 LET hs=0
20 GO SUB 8000
50 POKE 23674,255: POKE 23673,255: POKE 236
72,255
100 PRINT  PAPER 5;AT y1,x1;"  ";AT y1+1,x1
;"  "; INK 0;AT y,x;b$;AT y+1,x;c$: LET y1=y
: LET x1=x
120 IF y(t)=4 THEN  GO SUB 1000
480 LET g=g+(2 AND IN 65278=251 AND g<31)-(2
 AND IN 65278=253 AND g>0)
500 PRINT AT f1,g1; INK 4; OVER 1;"/";AT f,g
;"/": LET f1=f: LET g1=g
```

```
 510 IF IN 32766=251 THEN  GO SUB 2000
 700 LET t=INT (RND*5)+1: LET y(t)=y(t)-1: IF
 y(t)<h2 AND y(t)>h1 THEN  LET h2=y(t): LET f
 12=t
 710 IF y(t)<h1 THEN  LET h1=y(t): LET f11=t
 750 PRINT  INK t+2;AT y(t),t*6-5;"M   N";AT
 y(t)+1,t*6-5;"      ";AT y(t)+2,t*6-5;"Q ■ R";
  INK 4;AT y(t)+3,t*6-5;"  ■   ";AT y(t)+1,t*6-
 3;"O"
 800 IF x<f11*6-4 THEN  LET b$=a$(3): LET c$=
 a$(4): LET x=x+1
 820 IF x>f11*6-4 THEN  LET b$=a$(1): LET c$=
 a$(2): LET x=x-1
 999 GO TO 100
1000 IF x=t*6-4 THEN  GO TO 1500
1002 IF g=t*6-3 THEN  PRINT  INK 4; OVER 1;AT
 f,g;"P"
1005 FOR f=4 TO 17
1010 PRINT  INK t+2;AT f,t*6-5;"      ";AT f+1
 ,t*6-5;"M   N";AT f+2,t*6-5;"      ";AT f+3,t*
 6-5;"Q ■ R"; INK 4;AT f+4,t*6-4;" ■ ";AT f+2,
 t*6-3;"O"
1020 BEEP .04,f
1030 NEXT f
1035 LET f=21
1040 LET y(t)=18
1050 IF t=f11 THEN  LET f11=f12: LET h1=h2
1100 IF g=t*6-3 THEN  PRINT  INK 4; OVER 1;AT
 f,g;"P"
1300 RETURN
1500 IF b$=a$(1) THEN  LET d=x+1
1502 IF b$=a$(3) THEN  LET d=x
1503 LET time=INT ((65536*PEEK 23674+256*PEEK
  23673+PEEK 23672)/49)
1505 FOR i=0 TO 3: FOR g=1 TO 10
1510 BEEP .005,2: BEEP .005,5: PRINT AT i,d;"
PAPER 5; INK 0;a$(1,2 TO ): BEEP .005,7: PRIN
T AT i,d; PAPER 5; INK 0;a$(3, TO 2)
1520 NEXT g
1530 PRINT AT i,x; PAPER 5;"   ";AT i+1,x; IN
K 0;b$;AT i+2,x;c$
1540 NEXT i
1550 FOR f=1 TO 200: NEXT f
1560 CLS : PRINT AT 4,0; INK 6;"You survived
 for "itime;" seconds."
1570 IF time>hs THEN  LET hs=time: PRINT  INK
 5;"'"Well done! That's the longest   recorded
 time!": GO TO 1600
1580 PRINT ' INK 5;"The longest recorded time
 standsat "ihs;" seconds."
1600 PRINT  INK 7;"'"Press any key to play aga
in."
1610 IF INKEY$="" THEN  GO TO 1610
1630 CLS : GO TO 20
2000 BEEP .01,20: IF g<>3 AND g<>9 AND g<>15
AND g<>21 AND g<>27 THEN  RETURN
2005 IF g=u*6-3 OR y((g+3)/6)>15 THEN  RETURN
2010 LET u=(g+3)/6
2020 LET y(u)=y(u)+2
2050 PRINT  INK u+2;AT y(u)-2,u*6-5;"      ";A
T y(u)-1,u*6-5;"      ";AT y(u),u*6-5;"M   N";
AT y(u)+1,u*6-5;"      ";AT y(u)+2,u*6-5;"Q ■
 R"; INK 4;AT y(u)+3,u*6-4;" ■ ";AT y(u)+1,u*6
 -3;"O"
2070 IF u=f11 THEN  IF y(u)>h2 THEN  LET h1=h
2: LET f11=f12: LET f12=u: LET h2=y(u)
2090 RETURN
8000 DIM y(5): FOR f=1 TO 5: LET y(f)=18
8010 PRINT  INK f+2;AT y(f),f*6-5;"M   N";AT
 y(f)+1,f*6-5;"      ";AT y(f)+2,f*6-5;"Q ■ R";
  INK 4;AT y(f)+3,f*6-3;"■";AT y(f)+1,f*6-3;"O
"
8020 NEXT f
8100 FOR f=0 TO 3: PRINT AT f,0; PAPER 5;"
                    ": NEXT f
8500 LET y=0: LET x=15
8510 LET f=21: LET g=15
8520 DIM a$(4,3): LET a$(1)="ABC": LET a$(2)=
"DEF": LET a$(3)="GHI": LET a$(4)="JKL": LET
b$=a$(1): LET c$=a$(2)
8530 LET y1=y: LET x1=x: LET f1=f: LET g1=g
8540 PRINT AT f,g; OVER 1;"P"
8550 LET h1=20: LET h2=20: LET f11=2: LET f12
=4
8560 LET t=1
8570 LET u=10
8900 BEEP .5,0
8999 RETURN
9000 PRINT "■■■ ■ ■ ■■■ ■■■ ■ ■ ■■■ ■■■ ■■■■
 ■ ■ ■   ■   ■ ■ ■ ■ ■ ■   ■ ■ ■   ■
 ■■■  ■■■ ■■■ ■■■ ■■■■ ■ ■ ■ ■   ■ ■ ■ ■
   ■  ■■■ ■■■ ■■■ ■■■  ■   ■■■ ■■■ ■■■"
9010 RANDOMIZE 100
9020 LET y=8: LET y1=8: FOR f=1 TO 29
9025 BEEP .01,-10
9030 PRINT AT y1,f-1;"   ";AT y1+1,f-1;"   ";
AT y,f;"GHI";AT y+1,f;"J L"; INK 6;AT y+1,f+1
;"K"
9035 LET y1=y
9040 BEEP .01,-10
9050 IF RND>.5 THEN  LET y=y+1-(2 AND RND>.5)
 9060 NEXT f
9070 PRINT AT y1,f-1;"   ";AT y1+1,f-1;"   "
9080 PRINT  INK 6;AT 6,6;" @  PAUL STANLEY"
9100 PRINT AT 8,0; INK 5;"A giant bee likes n
ectar from   giant flowers, but you have to
stop it because you eat nectar  as well!!"
9200 PRINT  INK 6;"Chop chunks out of the sta
lks   with M (but note that once a    piece h
as been cut out of one   stalk you must cut t
he next    piece out of a different stalk)."
9300 PRINT '"Move left with Z & right with X.
"
9400 PRINT  INVERSE 1;"PRESS ANY KEY TO START
."
9500 IF INKEY$="" THEN  GO TO 9500
9600 CLS : RANDOMIZE : BORDER 5
9700 RESTORE : FOR x=USR "a" TO USR "r"+7
9710 READ n: POKE x,n
9720 NEXT x
9730 DATA 0,2,34,17,9,5,5,5,7,24,32,33,66,66,
68,69,128,124,226,34,34,66,130,12,7,13,25,63,
63,31,15,7,170,170,170,170
9740 DATA 170,170,170,170,240,248,252,254,252
,248,240,224,1,62,71,68,68,66,65,48,224,24,4,
132,66,66,34,162,0,64,68,136,144,160,160,160,
15,31,63,127
9750 DATA 63,31,15,7,85,85,85,85,85,85,85,85,
224,176,152,252,252,248,240,224,96,224,224,11
2,120,60,30,15,6,6,7,15,30
9760 DATA 60,120,240,108,104,75,139,145,73,81
,255,220,220,72,126,72,28,20,20,15,7,3,1,0,0,
0,0,240,224,192,128,0,0,0,0
9770 RETURN
```

Santa has a problem, his crane driver asked for a holiday this Christmas. So Santa said yes: what else could he do, the poor fellow has worked every Christmas for at least the past 100 years. Santa's problem now is to get a replacement. Fortunately you're here to help out in this time of crisis.

As soon as the main Christmas rush is over, you know, up until the 26th, Santa's warehouse starts on next year's presents. These have to be loaded into the crane and then dropped through the chimnies into the baskets passing below.

As time goes on the baskets move faster and faster, due, of course, to the increasing rush as people change their minds about what they are getting for Christmas. Your job, as crane driver, is to try and keep up. If you get a high enough score then you may get a holiday in 50 years or so instead of the usual 100. One tip: watch out for inertia as you move the crane.

The program that loads up the presents should be run first (loader program). Then the main crane control program is loaded next ("CHIM").

Chimney Drop for the BBC/Electron by Kenn Garroch.

```
  10MODE 1
  20PROCINIT
  30PROCINSTRUC
  40CHAIN"CHIM"
  50DEFPROCINIT
  60VDU23,240,255,4,4,4,255,32,32,32,23
,241,240,16,16,16,240,144,144,144
  70VDU23,242,15,9,9,9,15,8,8,8,23,243,
240,16,16,16,248,40,40,40
  80VDU23,244,252,4,4,4,254,34,34,34
  90VDU23,245,255,5,5,5,255,32,32,32
  100VDU23,246,15,8,8,8,7,4,4,4
  110VDU23,247,3,2,2,2,1,1,1,1
  120VDU23,248,0,0,0,0,128,128,128,128
  130VDU23,249,192,64,64,64,224,160,160,
160
  140VDU23,250,255,65,65,65,255,8,8,8
  150VDU23,251,255,193,193,193,127,72,72
,72
  160VDU23,252,63,33,33,33,31,24,24,24
  170VDU23,224,255,16,16,16,255,131,131,
131
  180VDU23,225,254,18,18,18,252,132,132,
132
  190VDU23,226,248,24,24,24,240,144,144,
144
  200VDU23,227,224,96,96,96,192,64,64,64
  210VDU23,228,128,128,128,128,0,0,0,0
  220VDU23,229,1,1,1,1,3,2,2,2
  230VDU23,230,7,4,4,4,15,8,8,8
  240VDU23,231,31,20,20,20,63,32,32,32
  250VDU23,232,127,68,68,68,255,192,192,
192
  260VDU23,253,129,129,129,129,129,255,1
02,102
  270VDU23,254,0,0,60,36,36,60,0,0
  280VDU23,255,0,0,0,24,24,0,0,0
  290VDU23,234,102,102,255,129,129,129,1
29,129
  300ENDPROC
  310DEFPROCINSTRUC
  320PRINTTAB(10,5)"CHIMNEY DROP"
  330PRINT
  340PRINT"   You're aim is to get the p
arcels"
  350PRINT"down the chimnies into the tr
olly."
  360PRINT
  370PRINT"  The controls are:"
  380PRINT
  390PRINT" Z moves the crane ";CHR$234;
" to the left"
  400PRINT
  410PRINT" X moves the crane ";CHR$234;
" to the right"
  420PRINT
  430PRINT" The space bar causes the par
cels"
  440PRINT"to drop !!"
  450PRINT
  460PRINT"GOOD LUCK !!"
  470PRINT
  480PRINT"Press any key to begin"
  490A$=GET$
  500ENDPROC
```

```
  10DIM SCR%(4,6)
  20MODE 2
  30*FX 10,40
  40*FX 9,30
  50VDU23;8202;0;0;0;
  60ENVELOPE1,130,-1,-1,-1,40,40,40,127
,-1,-1,-127,126,60
  70ENVELOPE2,128,0,0,0,0,0,0,127,-1,-1
,-127,126,10
  80FOR T%=0 TO 4:PROCSCRN(T%):NEXT
  90PROCCON
  100COL%=3
  110SC%=0
  120S%=20
  130VP%=1
  140PK%=5
  150PROCPK(PK%)
  160SOUND0,-15,3,255
  170FL%=0
  180FL1%=1
  190DFL%=0
  200PL%=0:PS%=30
  210FOR T%=0 TO 1400 STEP 5%
  220IFPK%(1 AND VP%=0 AND FL%=0  PROCEN
D
  230SOUND&11,0,ABS(PS%),10
  240SOUND&10,-15,3,10
  250PROCSCORE
  260PROCMV(T%,S%)
  270IFFL%=1 OR DFL%=1 PS%=0:GOTO300
  280IFINKEY(-98) THEN PS%=PS%-4
  290IFINKEY(-67) THEN PS%=PS%+4
  300PL%=PL%+PS%:PROCPLY(PL%,PS%)
  310IFPL%(-50 PL%=-50
  320IFPL%)1279 PL%=1279:GOTO340
  330IF INKEY(-99) AND(PL% MOD 256)>60 A
ND(PL% MOD 256)<120 AND DFL%=0 AND SCR%(
ABS(INT(PL%/256)),0)<>0 COL%=PL%/256:DFL
%=1:PK%=PK%-1:PROCPK(PK%):SOUND&12,1,255
,33
  340 IF DFL%=1 AND FL%=0 PROCDROP(COL%)
  350NEXT
  360S%=S%+10
  370IFPL%=1 FL%=0:FL1%=1:PS%=30
  380IF VP%=0 PROCSCRN(RND(5)-1):COL%=RN
D(5)-1
  390GOTO210
  400DEFPROCSCRN(HX)
  410COLOUR RND(7)
  420HX=HX*4
  430LOCAL A%,L%,T%
  440L%=28
  450VX=0
  460A%=RND(8)
  470ONA%GOTO480,530,580,630,680,730,780
,830
  480A%=RND(3)
  490VX=VX+4
  500IFVX>L% THEN 870
  510PROCCHIM(1,HX,VX)
  520ON%GOTO530,580,680
  530A%=RND(2)
  540VX=VX+4
  550IFVX>L% THEN 870
  560PROCCHIM(2,HX,VX)
  570ON%GOTO630,780
  580A%=RND(2)
  590VX=VX+4
  600IFVX>L% THEN 870
  610PROCCHIM(3,HX,VX)
  620ON%GOTO730,480
  630A%=RND(3)
  640VX=VX+4
  650IFVX>L% THEN 870
  660PROCCHIM(4,HX,VX)
  670ON%GOTO680,580,530
  680A%=RND(3)
  690VX=VX+4
  700IFVX>L% THEN 870
  710PROCCHIM(5,HX,VX)
  720ON%GOTO680,580,530
  730A%=RND(2)
  740VX=VX+4
  750IFVX>L% THEN 870
  760PROCCHIM(6,HX,VX)
  770ON%GOTO480,730
  780A%=RND(2)
```

```
790VX=VX+4
800IFVX<LX THEN 870
810PROCCHIM(7,HX,VX)
820ONAX%GOTO630,780
830VX=VX+4
840IFVX<LX THEN 870
850PROCCHIM(8,HX,VX)
860GOTO830
870REM
880ENDPROC
890DEFPROCCHIM(AX,X%,Y%)
900SCR%(X%/4,(Y%/4)-1)=AX
910IFY%/4-1<5 SCR%(X%/4,6)=5
920IFY%/4-1<5 AND AX=8  SCR%(X%/4,6)=8
930IFAX=1PROCCHSLR(X%,Y%)
940IFAX=2PROCCHSLC(X%,Y%)
950IFAX=3PROCCHSRC(X%,Y%)
960IFAX=4PROCCHSRL(X%,Y%)
970IFAX=5PROCCHCV(X%,Y%)
980IFAX=6PROCCHRV(X%,Y%)
990IFAX=7PROCCHLV(X%,Y%)
1000IFAX=8PROCWALL(X%,Y%)
1010ENDPROC
1020DEFPROCCHSLR(X%,Y%)
1030VDU31,X%,Y%,240,240,227,231,10,8,8,
8,8,240,224,228,232,10,8,8,8,8,240,225,2
29,240,10,8,8,8,8,240,226,230,240
1040ENDPROC
1050DEFPROCCHSLC(X%,Y%)
1060VDU31,X%,Y%,240,227,231,240,10,8,8,
8,8,224,228,232,240,10,8,8,8,8,225,229,2
40,240,10,8,8,8,8,8,226,230,240,240
1070ENDPROC
1080DEFPROCCHSRC(X%,Y%)
1090VDU31,X%,Y%,240,243,246,250,10,8,8,
8,8,240,244,247,250,10,8,8,8,8,240,245,2
48,251,10,8,8,8,8,8,240,249,252
1100ENDPROC
1110DEFPROCCHRV(X%,Y%)
1120VDU31,X%,Y%
1130FOR TX=0 TO 3
1140VDU240,240,241,242
1150VDU10,8,8,8,8
1160NEXT
1170ENDPROC
1180DEFPROCCHCV(X%,Y%)
1190VDU31,X%,Y%
1200FORTX=0 TO 3
1210VDU240,241,242,240
1220VDU10,8,8,8,8
1230NEXT
1240ENDPROC
1250DEFPROCCHSRL(X%,Y%)
1260VDU31,X%,Y%,243,246,250,240,10,8,8,
8,8,244,247,250,240,10,8,8,8,8,245,248,2
51,240,10,8,8,8,8,8,240,249,252,240
1270ENDPROC
1280DEFPROCCHLV(X%,Y%)
1290VDU31,X%,Y%
1300FORTX=0 TO 3
1310VDU241,242,240,240
1320VDU10,8,8,8,8
1330NEXT
1340ENDPROC
1350DEFPROCWALL(X%,Y%)
1360VDU31,X%,Y%
1370FOR TX=0 TO 3
1380VDU240,240,240,240
1390VDU10,8,8,8,8
1400NEXT
1410ENDPROC
1420DEFPROCMV(XX,8%)
1430IF VP%=6 AND X%>(COL%*256)+40 AND X
%<(COL%*256)+150 FLX%=1:FL1%=0:SC%=SC%+((
10-COL%)*10)
1440IF FLX=1 AND VP%<>0:REPEAT PROCDROP
(COL%): UNTIL VP%=0
1450IF FLX=1 SOUND&13,2,XX%/6,30:SOUND&1
2,2,XX/7,30
1460VDU 5
1470FX=0:GX=0
1480*FX19
1490MOVEXX-SX,58:GCOL0,0:VDU253,8,18,0,
FX,FLX*254,8,18,0,8%,FLX*255
1500FX=12:GX=14
1510*FX19
1520MOVE XX,58:GCOL0,3:VDU253,8,18,0,F
,FLX*254,8,18,0,8%,FLX*255
1530VDU 4
1540ENDPROC
1550DEFPROCCON
1560MOVE0,28
1570MOVE1280,28
1580PLOT 85,0,10
1590PLOT 85,1280,10
1600GCOL0,5
1610MOVE0,954:PLOT5,1280,954
1620ENDPROC
1630DEFPROCDROP(COL%)
1640FX=0:GX=0
1650IF VP%=0 GOTO 1720
1660VP%=VP%-1
1670ON SCR%(COL%,VP%) GOSUB 1780,1800,1
780,1800,1820,1840,1860,1880
1680*FX19
1690VDU5,18,0,FX,254,8,18,0,GX,255,4
1700VP%=VP%+1
1710IF VP%=7 VP%=0:DFL%=0:ENDPROC
1720FX=12:GX=14
1730 ON SCR%(COL%,VP%) GOSUB 1780,1800,
1780,1800,1820,1840,1860,1880
1740*FX 19
1750VDU5,18,0,FX,254,8,18,0,GX,255,4
1760VP%=VP%+1
1770ENDPROC
1780MOVE128+(COL%*256),((7-VP%)*128)-64
1790RETURN
1800MOVE64+(COL%*256),((7-VP%)*128)-64
1810RETURN
1820MOVE96+(COL%*256),((7-VP%)*128)-64
1830RETURN
1840MOVE160+(COL%*256),((7-VP%)*128)-64
1850RETURN
1860MOVE32+(COL%*256),((7-VP%)*128)-64
1870RETURN
1880GX=0:FX=0:RETURN
1890DEFPROCFLY(X%,8%)
1900FX=0:GX=0
1910VDU5
1920*FX19
1930MOVEX%-8%,950:GCOL0,0:VDU234,8,18,0
,FX,254,8,18,0,GX,255
1940FX=12:GX=14
1950IFDFL%=1 FX=0:GX=0
1960*FX19
1970MOVE X%,950:GCOL0,3:VDU234,8,18,0,F
%,FL1%*254,8,18,0,GX,FL1%*255
1980VDU 4
1990ENDPROC
2000DEFPROCSCORE
2010COLOUR RND(7)
2020PRINTTAB(0,0)"SCORE "+SC%+"  "
2030ENDPROC
2040DEFPROCPK(N%)
2050LOCAL X%
2060FOR TX=1 TO N%
2070MOVE700+(TX*64),1000
2080VDU5,18,0,12,254,8,18,0,14,255,4
2090NEXT
2100FOR TX=N% TO 11
2110MOVE700+(TX*64),1000
2120VDU5,18,0,0,254,8,18,0,0,255,4
2130NEXT
2140 ENDPROC
2150DEFPROCEND
2160FOR X=1 TO 4
2170FOR TX=100 TO 200STEP&11,-15,TX,5
:NEXT
2180FOR TX=190 TO 190STEP&11,-15,TX,5
:NEXT
2190FOR TX=190 TO 50STEP-1:SOUND&11,-15
,TX,1:NEXT
2200NEXT
2210CLS
2220COLOUR 1
2230PRINTTAB(4,0)"END OF GAME"
2240COLOUR2
2250PRINTTAB(4,5)"SCORE IS "SC%
2260COLOUR3
2270PRINTTAB(4,20)"ANOTHER GAME ??"
2280*FX 15,0
2290A$=GET$
2300IF A$="N" THEN END
2310IF A$="Y" THEN RUN
2320GOTO2290
2330ENDPROC
```

```
    1 REM   X-MAS  EVE
    2 REM  PAUL STANLEY
    3 REM CONVERTED  FOR
    4 REM        VIC-20
    5 REM GREGORY MICHAEL
    6 PRINT"❐":HM=7680:CO=30720:IFPEEK(4
096)=32THENHM=4096:CO=33792
    7 GOSUB8000:HS=0:POKE783,PEEK(783)AN
D254
   10 GOSUB9000
   15 SK=.98:S=0:POKE36878,15
   20 X=16:S1$="▮└┘▮▮▮┤|":S2$="▮└┘
┘|├":S$=S1$:DEFFNP(X)=HM+INT(X)*22
+H
   21 D$="                  ":REM 18 SPA
CES
   25 G=1:H=INT(RND(8)*18)+2
   26 PRINT"▮"TAB(13)"▮HIGH"HS
   27 P=0
   28 PRINT"▮▮PRESENTS"S
   30 IFPEEK(197)=26THENX=X+1+(X>15):S$=
S2$
   35 IFPEEK(197)=33THENX=X-1-(X<1):S$=S
1$
   40 POKE782,X:POKE781,10:SYS65520:PRIN
T"   ▮▮▮▮▮▮▮   ":POKE782,X+1
   41 SYS65520:PRINTS$
   50 IFP=0THENG=G+1:POKEFNP(G-1),32:POK
EFNP(G)+CO,6:POKEFNP(G),219:IFG=10THENK0=
1
   51 IFK0=1THENK0=0:IFH=X+1ORH=X+2ORH=X
+3ORH=X+4THENP=1
   60 IFG=12THENIFPEEK(HM+(G+1)*22+H)=93
THEN1000
   65 IFG=12THENPOKEFNP(12),32:G=1:H=INT
(RND(8)*18)+2
   70 IFP=1THENIF(PEEK(653)AND1)=1THENG=
10:H=X+4+(S$=S2$)*3:P=0
   80 IFRND(8)>SKTHENQ=INT(RND(8)*5)+1:E
=INT(RND(8)*4):POKEHM+16*22+Q*4-E,32:K0=1

   81 IFK0=1THEND$=LEFT$(D$,Q*4-E-1)+"P"
+MID$(D$,Q*4-E+1,255)
   82 IFK0=1THENK0=0:IFMID$(D$,Q*4-3,4)=
"PPPP"THEN2000
   90 GOTO30
 1000 POKEFNP(12),32
 1010 IF(PEEK(HM+CO+22*18+H)AND7)=7THEN2
5
 1015 S=S+1:PRINT"▮▮PRESENTS"S
 1020 FORI=0TO1:FORJ=0TO1:POKEHM+CO+(18+
I)*22+H+J,7:NEXTJ,I
 1022 FORF=1TO10:POKE36876,227+F:POKE368
76,195+F:NEXT:POKE36876,0
 1025 FORF=3TO19STEP4
 1027 IF(PEEK(HM+CO+18*22+F)AND7)=7THENN
EXTF:SK=SK-.02:PRINT"❐":GOSUB9000:GOTO20
 1030 F=30:NEXTF:GOTO25

 2000 IF(PEEK(CO+HM+18*22+Q*4-1)AND7)<>7
THEN6000
 2010 GOTO30
 5000 RESTORE:FORF=1TO26:READB,A:POKE368
76,B
 5002 FORI=15TO0STEP-2/A:POKE36878,I:NEX
TI
 5010 NEXTF:POKE36876,0
 5020 RETURN
 5100 DATA195,2,195,2,195,4,195,2,195,2,
195,4,195,2,203,2,179,2,187,2,195,6,0,1,1
99
 5110 DATA2,199,2,199,2,199,2,199,2,195,
2,195,2,195,2,204,2,204,2,199,2,187,2,179
,4,217,2
 6000 FORF=10TO2STEP-.5:POKE781,F:POKE78
2,X:SYS65520:PRINTS$"▮▮▮▮▮▮      ";
 6001 POKE36876,230-F*5:NEXTF:POKE36876,
0:PRINT"❐▮▮▮▮▮    "
 6002 IFS>HSTHENHS=S
 6005 PRINT"▮▮▮▮▮▮▮▮▮▮▮▮GAME OVER
 6045 GOSUB5000
 6050 PRINT"❐▮PRESS A KEY TO START
 6060 POKE198,0:WAIT198,1:PRINT"❐":GOTO1
0
 8000 POKE36879,10:PRINTCHR$(14)CHR$(8)"
    ┼HRISTMAS ▔VE":
 8002 PRINT"▮▮▮▮▮╲T IS APPROACHING   MID
NIGHT ON ┼HRISTMAS EVE AND ◆ANTA IS LATE.
";
 8004 PRINT" ▕OU PLAY THE PART OF  ◆ANTA
AND YOU MUST    DELIVER PRESENTS WHICH";
 8006 PRINT"ARE THROWN TO YOU BY  YOUR E
LVES. |AVING      CAUGHT A PRESENT (BY
 8008 PRINT"FLYING DIRECTLY BELOW IT),YO
U MUST MOVE OVERA CHIMNEY AND DROP A
 8010 PRINT"PRESENT DOWN IT.
 8012 PRINT"▮▮OHEN A PRESENT HAS  BEEN D
ROPPED DOWN A    CHIMNEY,THE FAMILY IN
 8014 PRINT"THAT HOUSE IMMEDIATELYSTART
WORK ON OPENING UP THE PRESENT AND...
 8015 PRINT"▮▮RESS A KEY.";:POKE198,0:W
AIT198,1:PRINT
 8016 PRINT"▮▮▮▮...THEY WILL TURN THE L
IGHT ON.┼ROPPING A    PRESENT DOWN THE
 8018 PRINT"CHIMNEY OF A LIT HOUSEWILL N
OT COUNT."
 8020 PRINT"▮▮|ENEATH EACH ROOF    YOU WI
LL SEE A PATCH  OF SNOW WHICH MELTS AS";
 8022 PRINT"TIME ELAPSES.|HIS      MELTS
AT A RATE WHICH IS PROPORTIONAL TO THE";
 8024 PRINT"ACTIVITY WITHIN THE    HOUSE.
"

 8026 PRINT"▮▮S THE PRESENTS MUSTBE PLA
CED DOWN THE    CHIMNEYS BEFORE ANYONE";
 8028 PRINT"SEES YOU,IF ALL THE   SNOW H
AS MELTED UNDER ANY PARTICULAR ROOF,
 8030 PRINT"WITHOUT A PRESENT     BEING
DROPPED BEFORE  THIS OCCURS,IT WILL...";
 8031 PRINT"▮▮RESS A KEY.▮";:POKE198,0:
WAIT198,1:PRINT
 8032 PRINT"▮▮▮▮...INDICATE THAT THE  IN
HABITANTS ARE AWAKE AND YOU WILL HAVE TO
 8034 PRINT"RETURN IMMEDIATELY."
 8040 PRINT"▮▮▮▮▮◆▮","▮LEFT"
 8041 PRINT"▮▮▮◆▮","▮LIGHT"
 8042 PRINT"▮▮▮◆ ├─|▮","▮┼ROP PRESENT"
 8046 PRINT"▮▮▮▮RESS A KEY TO START.▮▮▮
":poke198,0:wait198,1:return
 9000 PRINT"❐"CHR$(142):POKE783,PEEK(783
)AND254:FORX=2TO18STEP4:POKE781,13:POKE78
2,X:SYS65520
 9010 PRINT"▮|▮▮ ▮▮▮▮  ▮▮▮▮▮    ▮▮▮
▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
 9020 NEXT:RETURN
10000 :PRINT"▮▮▮MOVE RIGHT WITH 'Z'"
10010 PRINT"MOVE  LEFT WITH 'X'"
10020 PRINT"DROP PRESENTS WITH 'SHIFT'
10030 IF INKEY$=""THEN 10030
10040 RETURN
```

Xmas Eve

Xmas Eve is a race against time for Santa, who must rush to deliver presents before the inhabitants of the houses awake.

By manoeuvering Santa's sleigh left and right you can catch the presents as they are thrown down from above by the elves. Presents can then be dropped down the chimneys by pressing the shift key. Each time a present is successfully delivered, the inhabitants of the house awake and switch on the lights, which causes the snow on the roof to melt.

The more work Santa does the more he has to hurry in order to complete his work without being seen.

From the Pan/Personal Computer News Computer Book Library: Sixty Programs for the Vic-20 by Robert Erskine, Humphrey Walwyn, Paul Stanley and Michael Bews.

Bridge Builder

The aim of this game is to build a bridge across the top of the ravine. This is achieved by building a series of beams vertically and horizontally.

This cursor can be moved up or down — but not diagonally — using a joystick plugged into port 1. The game is made more difficult by an inspector (the man in black) who checks to make sure the bridge is built correctly.

The beams must always start below the inspector, and after every beam has been built the inspector moves to a different position. The horizontal beams must be supported at both ends, either by the ground or by other beams.

The aim is to build a bridge in as few days as possible.

From the User Club library of The Silica Atari Users Club, 1-4 The Mews, Hatherly Road, Sidcup, Kent DA14 4DX.

```
0
100 GRAPHICS 0
105 POSITION 13,0:? "BRIDGE BUILDER"
110 POKE 752,1:OPEN #2,4,0,"K:"
115 ? :?
120 ? " YOU ARE NOW AN OFFICIAL ENGINEER!":?
125 ? "  YOUR MISSION IS TO BUILD A BRIDGE"
130 ? "CONNECTING THE TWO BLOCKS AT THE TOP"
135 ? "OF THE SCREEN.  YOU DO SO BY PLACING"
140 ? "BEAMS ALONG THE INSPECTOR'S FEET."
145 ? "SIMPLY MOVE THE POINTER TO THE PLACE"
150 ? "WHERE YOU WISH TO PLACE A BEAM, THEN"
155 ? "ENTER THE DIRECTION YOU WISH TO SET"
160 ? "THE BEAM. TRY TO CONSTRUCT THE BRIDGE"
165 ? "IN AS FEW DAYS AS POSSIBLE."
170 ? :? :? "        PRESS RED BUTTON TO START"
175 IF STRIG(0)<>1 THEN 185
180 GOTO 175
185 GRAPHICS 5:SETCOLOR 2,0,0
190 POKE 752,1:SETCOLOR 1,11,10
195 SETCOLOR 0,15,2:SETCOLOR 4,8,4
200 COLOR 1
205 FOR X=0 TO 79:PLOT X,39:NEXT X
210 PLOT 0,8:DRAWTO 5,8
215 PLOT 0,9:DRAWTO 5,9
220 PLOT 79,8:DRAWTO 74,8
225 PLOT 79,9:DRAWTO 74,9
230 Y=10:D=71:X=4
235 PLOT 0,Y:DRAWTO X+3,Y
240 PLOT 79,Y:DRAWTO X+D-3,Y
245 Y=Y+1
250 IF INT(RND(0)*10)>3 THEN X=X+1:D=D-2
255 IF Y<39 THEN 265
260 GOTO 235
265 X=29+INT(RND(0)*17):Y=38
270 GOSUB 915
275 M=INT(RND(0)*31)+25:N=0
280 LOCATE M,N+1,XX
285 IF XX<>0 THEN 295
290 N=N+1:GOTO 280
295 N=N-1:IF N<0 THEN N=0
300 ? :? :? :?
305 ? "USE JOYSTICK TO MOVE BEAM POINTER..."
310 ? "      DAY "*1DA+1;" OF CONSTRUCTION"
315 IF M>76 THEN M=76
320 COLOR 2:PLOT M,N
325 FOR XX=1 TO 20:NEXT XX
330 C=STICK(0):IF C=15 THEN 325
335 IF C=7 THEN 360
340 IF C=11 THEN 380
345 IF C=13 THEN 400
350 IF C=14 THEN 418
355 GOTO 315
360 LOCATE M+1,N,XX
365 IF XX<>0 THEN 435
370 COLOR XX:PLOT M,N
375 M=M+1:COLOR 1:GOTO 315
380 LOCATE M-1,N,XX
385 IF XX<>0 THEN 435
390 COLOR XX:PLOT M,N
395 M=M-1:COLOR 1:GOTO 315
400 LOCATE M,N+1,XX
405 IF XX<>0 THEN 435
410 COLOR XX:PLOT M,N
415 N=N+1:COLOR 1:GOTO 315
418 IF N>0 THEN LOCATE M,N-1,XX
419 IF XX<>0 THEN 435
420 COLOR 0:PLOT M,N
425 N=N-1:IF N<1 THEN N=1
430 COLOR 2:GOTO 315
435 IF XX=3 THEN 330
437 IF N<Y THEN ? :? :? "STICK MUST START BELOW
    INSPECTOR!":COLOR 0:PLOT M,N:CO
LOR 1
440 IF N<Y THEN FOR I=1 TO 200:SOUND 0,36,36,
    36:NEXT I:SOUND 0,0,0,0:GOTO 300
445 ? :?
446 ? "       PRESS BUTTON TO BUILD HERE":?
    :FOR DELAY=1 TO 100:NEXT DELAY:POKE 7
7,0
447 IF STRIG(0)=0 THEN 450
448 IF STICK(0)<>15 THEN 300
449 GOTO 447
450 ? :?
452 ? "      USE JOYSTICK TO SET BEAM"
455 ? "          IN EITHER DIRECTION"
460 REM
465 D=0:C=STICK(0)
470 IF C=15 THEN 465
475 IF C=14 THEN D=1
480 IF C=11 THEN D=2
485 IF C=7 THEN D=3
490 IF D<1 OR D>3 THEN 465
495 DA=DA+1:M1=M:N1=N
500 GO=0
505 FOR I=1 TO 10
510 GO=GO+1
515 SOUND 0,100,60,100
520 FOR XX=1 TO 10:NEXT XX
525 SOUND 0,0,0,0
530 IF M>76 OR M<6 OR M<2 THEN 585
535 COLOR 2:PLOT M,N
537 ON D GOTO 538,539,540,541
538 LOCATE M,N-1,XX:GOTO 545
539 LOCATE M-1,N,XX:GOTO 545
540 LOCATE M+1,N,XX:GOTO 545
541 LOCATE M+1,N,XX
545 IF XX=0 THEN 550
546 I=18:GOTO 555
550 I=I+INT(RND(0)*3)-1
555 ON D GOTO 560,565,570,575
560 N=N-1:GOTO 580
565 M=M-1:GOTO 580
570 M=M+1:GOTO 580
575 N=N+1
580 NEXT I
585 LOCATE M,N+1,XX
590 IF XX<>0 AND XX<>3 OR D=1 THEN 695
595 M=M1:N=N1
600 ? :?
605 ? "BOTH ENDS OF BEAM MUST BE SUPPORTED!"
610 FOR I=1 TO 200:SOUND 0,36,36,36
615 NEXT I:SOUND 0,0,0,0
```

```
620 REM
625 FOR I=1 TO 99:COLOR 0
630 PLOT M,N
635 SOUND 0,100,60,100
640 FOR XX=1 TO 10:NEXT XX
645 SOUND 0,0,0,0
650 ON D GOTO 655,660,665,670
655 N=N-1:GOTO 675
660 M=M-1:GOTO 675
665 M=M+1:GOTO 675
670 N=N+1
675 IF N<2 THEN 685
680 NEXT I
685 REM
690 GOTO 275
695 SOUND 0,0,0,0
700 W=0:IF X<M THEN W=1
705 ? "      INSPECTION...":? :?
710 FOR I=1 TO INT(RND(0)*40)+10
715 SOUND 0,60,6,10:SOUND 0,0,0,0
720 GOSUB 935
725 IF W=1 THEN 775
729 REM WALKING LEFT
730 LOCATE X,Y+1,X1
735 LOCATE X+2,Y+1,X2
740 LOCATE X-1,Y+1,X3
741 LOCATE X+1,Y+1,X4
745 IF X1+X2+X3+X4=0 THEN Y=Y+1:GOTO 815
750 LOCATE X-1,Y,XX
755 IF XX=0 THEN X=X-1:GOTO 815
760 LOCATE X,Y-1,XX
765 IF XX=0 THEN Y=Y-1:GOTO 815
770 GOTO 815
772 REM WALKING RIGHT
775 LOCATE X,Y+1,XX
778 LOCATE X+1,Y+1,X1
780 LOCATE X+2,Y+1,X2
785 LOCATE X+3,Y+1,X3
790 IF XX+X2+X3=3 THEN Y=Y+1:GOTO 815
795 LOCATE X+3,Y,XX
800 IF XX=0 THEN X=X+1:GOTO 815
805 LOCATE X+3,Y-1,XX
810 IF XX=0 THEN Y=Y-1:GOTO 815
815 GOSUB 915
820 IF Y<4 OR X<5 OR X>69 THEN 830
825 NEXT I
830 REM
835 FOR I=5 TO 75:FOR J=5 TO 10
840 LOCATE I,J,XX:IF XX<>0 THEN 850
845 NEXT J:GOTO 275
850 NEXT I
855 FOR Z=1 TO 5
860 FOR Z1=200 TO 80 STEP -7
865 SOUND 0,Z1,10,7
870 SOUND 1,Z1+7,10,7
875 SOUND 2,Z1+14,10,7
880 NEXT Z1:NEXT Z
885 ? "YOU'RE DONE AND TOOK ";1DA;" DAYS!!"
890 FOR X=0 TO 2:SOUND X,0,0,0:NEXT X
895 ? "PRESS TRIGGER TO PLAY AGAIN"
900 POKE 77,0
905 IF STRIG(0)<>1 THEN RUN
910 GOTO 905
915 COLOR 3:PLOT X,Y:PLOT X+1,Y-1
920 PLOT X+2,Y:PLOT X+1,Y-3
925 PLOT X,Y-2:PLOT X+1,Y-2
930 PLOT X+2,Y-2:RETURN
935 COLOR 0:PLOT X,Y:PLOT X+1,Y-1
940 PLOT X+2,Y:PLOT X+1,Y-3
945 PLOT X,Y-2:PLOT X+1,Y-2
950 PLOT X+2,Y-2:RETURN
```

MAZEMAN

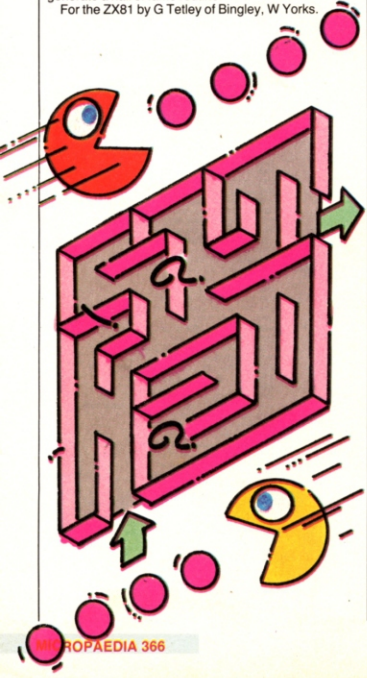
A Pac-Man type game for the ZX-81 renamed Mazeman. This version incorporates as many of the usual features as are possible in Basic on the ZX-81. For those of you who have never played Pac-Man (if there are any) the idea is to run from the ghosts when your power is low and eat the ghosts when your power is high. Power is gained by eating power-pills but keep your eye on it as it leaks away quite quickly.

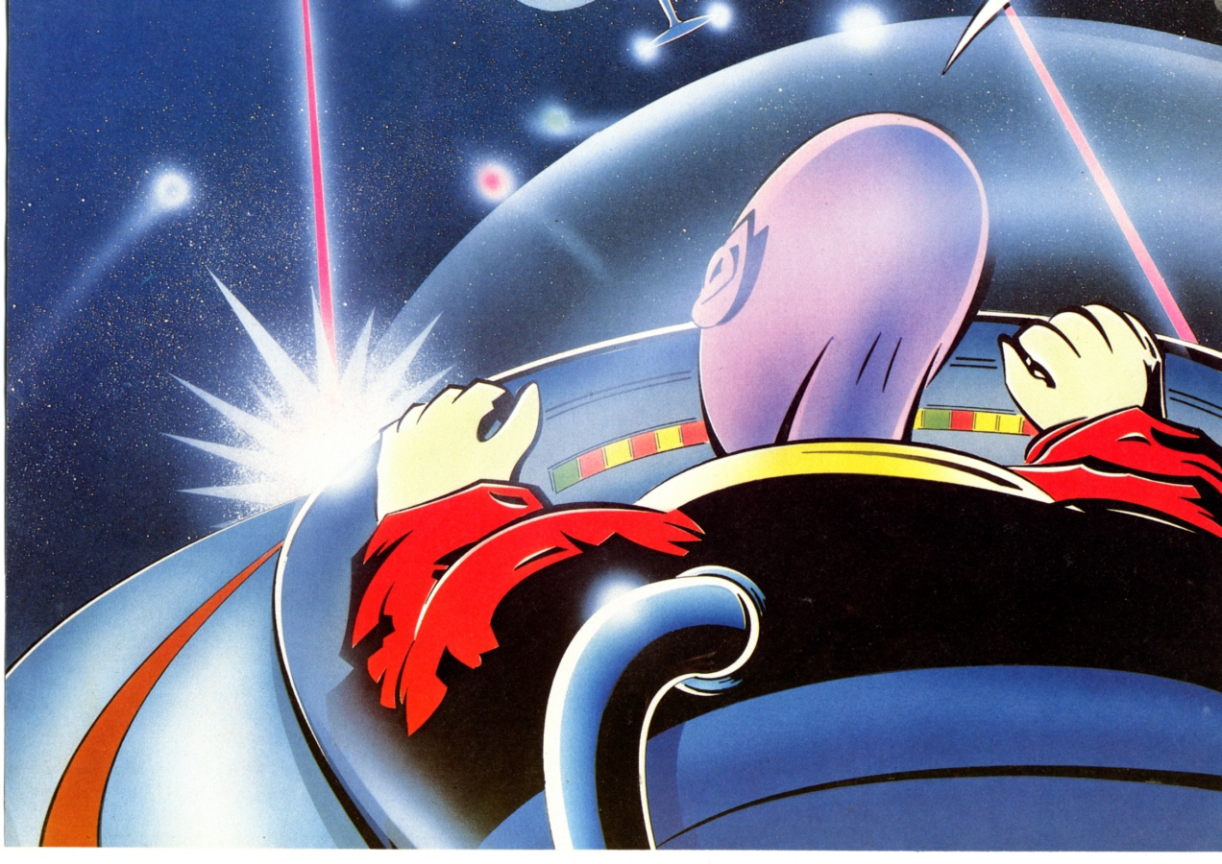
Lines 50 to 150 set up the instructions, 160 to 260 the variables. Lines 270 to 520 set up the maze, the maze blocks are graphic "A"s. Line 350 is graphic E, nine graphic sevens and a graphic R. Line 360 is obtained using graphic 5, nine spaces and a graphic 8. In lines 630, 720 to 790 the graphics character is A. The black looking squares in line 800 are in fact inverse speech marks.

Lines 810 and 820 control the exit, line 840 to 500 increase the score and power. The lines 950 to 995 and 1510 to 1580 calculate the lives lost and then display them. Lines 1120 to 1310 send the monsters back to the centre of the maze when eaten. Lines 1320 to 1390 re-print your character when the exit is used.

Lines 810 and 820 control the exit, lines 840 to 500 when you are caught by a monster. Lines 1720 to 1850 generate a hall of fame routine.

For the ZX81 by G Tetley of Bingley, W Yorks.





PUTTING IT RIGHT

Into every life a little rain must fall — and into most books a few mistakes inevitably creep.

The best-selling PAN/Personal Computer Library of books is, alas, no exception to this rule. Below we present an errata for the series of books — in the hope that it will demystify the odd sentence or program that you'll be typing in from these otherwise excellent volumes over Christmas.

Errata for 'Sixty programs for the ZX Spectrum'

ULA CHIP

If you bought your Spectrum after September 1983 and you are having problems with some of the programs it is quite possible that your Spectrum has the new ULA chip.

To test for this chip, type the following:
PRINT IN 57342
If you get the response 255, your Spectrum has not got the new chip. If, however, you got 191 in response to this statement you will have to make the following amendments to your programs.

The changes you will have to make are very simple, and they all relate to the IN statement.

FIG 1

OLD ULA	NEW ULA
254	190
253	189
251	187
247	183
239	175

MINELAY

Lines No. 9645-9750 have been changed as shown in Figure 2 below.

FIG 2

```
9630 BEEP .04,(g+i)/3
9640 NEXT g: PRINT AT 4,31;" ": NEXT f
9645 PLOT 16,173: DRAW 3,-10: DRAW 4,10: PLOT
 80,173: DRAW 7,-28
9650 PRINT "Move about the maze picking up
golden eggs, avoiding the mines & also the mi
ne-layer."
9700 PRINT  INK 6;"If you pick up an axe you
can "destroy the maze walls, mines,  and th
e mine-layer."
9750 PRINT "You begin with 3 lives, but an
extra life is given every 500  points."
9800 PRINT  INK 6;" O.....UP                Z.....
DOWN" INK 5;" I.....LEFT                P....RIGHT"
9900 INPUT "Press ENTER to start...";a$
9910 IF INKEY$<>"" THEN  GO TO 9910
9920 CLS
9999 RETURN
```

TOPTRAINER

The following line numbers have been changed:

FIG 3

```
10 DIM d(8)

20 NEXT i: GO SUB 30: GO TO 100

45 NEXT i: RETURN

600 GO SUB 4000: RESTORE 30: GO SUB 30

672 PRINT "Horse's letter"; "i: POKE 23658,255

675 PRINT y$: POKE 23658,0

683 IF a(i)<a THEN PRINT AT 21,0;"Not enough

861 PRINT AT 0,0;"The WINNER is "ih$(j): LET

865 GO SUB 9920

867 CLS

872 IF b(k)=bj THEN  LET a(k)=a(k)+b(k)*z+b(

879 GO SUB 9920

5050 IF x<0 THEN  LET b=b+x: LET x=0
```

CHOMPER

Unfortunately the wrong version of this program was published. Please write to Pan for the correct version. The one in the book does work, but there were no instructions as to what keys to use. PAN's address is at the bottom of this page.

ASSET STRIPPER

Line 1830 now reads:
1830 IF k1>k2 AND (zxch+eg)>=k2 THEN LET z1=z+.01

MOONLANDER

Line 2020 is the only line number changed; it now reads:

FIG 4

```
2020 IF H<=0 AND V>=5 THEN  PRINT  FLASH 1;AT
 11,8;"YOU HAVE LANDED": PRINT AT 20-(H1/100)
,col1;" "; PRINT  INK 5;AT 20,col1*4;" INK 0
```

Errata for 'Sixty programs for the Oric-1'

ALIEN

Line 20 — delete the last statement: LET C=O. Delete line 60. Delete line 74.

HANGMAN

Lines 304 onwards were unfortunately missing from the book. Please write to PAN for the completed listing.

MINELAY

Delete lines 4575 and 4576 on page 285.

Errata for 'Sixty programs for the Dragon 32'

In the introduction there should be an extra paragraph which reads:

'There are one or two circumstances in which your Dragon will refuse to RUN a perfectly correct program. The most common of these errors appears as '?FC ERROR' and occurs when a program attempts to access the Dragon's high resolution graphics. If a previous program has reallocated the area normally reserved for graphics to BASIC use, then when PMODE is used an error will be generated since there will be no graphics pages available. To solve this problem we simply need to CSAVE the program on tape and turn the Dragon off, and on again. Now reload the program and the Dragon should work normally.'

DEFEND

The following lines were omitted from the book: lines 485-675. Please see the complete listing earlier in this section.

SOCCER SUPREMO

Insert line 6325 which reads: 6325 X$=*

EVOLUTION 2

Line 500 — delete ":" at end of line.

MOONLANDER

Delete lines 9990, 9991, 62500 and 62700. These lines are found on page 118.

Errata for 'Sixty programs for the BBC Micro'

You will come across the '£' symbol in the listings; this is, in fact, the '£' character which you will find above the '' on the BBC Micro keyboard.

PICTURE PAIRS

This program was unfortunately SNAP in the book, the listings of PICTURE PAIRS can be obtained from PAN at the address below.

MORSE TUTOR

Line 1220 has been changed as shown in Figure 5 below.

FIG 5

```
1220 DATA .-,-.---,.-.-,.-.-,.---.,.-.-,.-.-.,.-.
.-,
.---,.-.-,.-.-,.-.-,.-.-,.---,.-.-,.---,.-.-,.-.
.-,.-.-,.-.-,.---,.-.-,.-.-,.-.-,.-.-,.-.-,.---,
.---,.---,.-.-,.-.-,.---,.-.-,.---,.---,
```

EVOLUTION 2

Unfortunately Evolution 1 was published twice, so write to PAN for a listing.

For further information contact Elizabeth Kinnell, Pan Books, Cavage Place, London SW10.

Micropaedia Editor: Geof Wheelwright
Design: Nigel Wingrove
Illustrations: John Hallett

Well, not quite next week – but in two weeks anyway. Micropaedia will be back with a complete three-part guide to the Acorn Electron micro. The first week will take a look inside Acorn's cut-down BBC, and then followed by a discussion of software and peripherals for the machine in the following two weeks.
We'll also take an A-Z sampling of the Electron's BBC Basic programming language with a look at some of the keywords and programming examples showing you how to use them.

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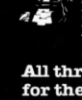
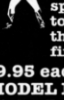


Part I. Franklin's Tomb, in which our hero receives a mysterious plea for help which leads him to a hidden tomb and the mystery of the stargate.



Part II. Lost in Space, in which our hero finds himself stranded on a derelict spacecraft, doomed to travel endlessly through space, or find a way out.

Part III. Fishy Business, in which our hero lands on a watery planet, discovers the source of the plea for help and saves the day.

All three programs cost £9.95 each and are available for the DRAGON 32, BBC MODEL B and 48k ORIC-1 microcomputers. (note: Fishy Business for the BBC and ORIC will be available February 1984).

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8.	Hex→Dec Converter	31.	Screen Fill	54.	Space Saver
9.	Remkill Condenser	32.	Screen Store	55.	Screen Overprint
10.	On Error Goto	33.	Screen Exchange	56.	Screen Invert
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17.	24 Line Printing	40.	Count Program	63.	Bright Off
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John Lettice on the trail of the Spectrum expansion route, helped by his soldering iron.

Spectrum call cards

Jay Myrdal

How many Spectrum owners are there in the UK? The number is impossible to judge with any degree of accuracy simply because the number is growing so fast — whatever figure you come up with, it's going to be out of date within months, if not weeks. Put this together with another salient feature of the machine, the lack of built in interfaces, and you can see that there's a tremendous market for add-ons, and for devices that will let the Spectrum talk to add-ons.

Of the expansion routes available, U-Microcomputers has followed a traditional one. The company has been active in the area of add-on cards for the Apple for some time now, and has recently transferred its attentions to the Spectrum.

The Apple and the Spectrum need a lot of adding to before you can perform complex tasks. When you open up a basic Apple II, you'll see seven empty expansion slots. However, you don't have to bother opening up a Spectrum — it's quite clear there is no space inside for expansion slots.

So the first step for U-Microcomputers was to remedy this. The company did this by producing three products. The first is the spectacularly overnamed and shockingly overpriced USP-ADAP. This is actually a simple plug device that fits onto the Spectrum edge connector and houses the mirror-image edge connector of the first backplane, which has three expansion slots plus an edge connector extension.

USP-ADAP is an adaptor costing £6.90. The only way to justify it is as an initial one-off investment. It is, however, necessary if you're to use the system. You can slot single cards into it, or you can plug them into the backplane, which then plugs into the adaptor. You can then add a four-slot extension into your original three-slotter, giving you the same as the Apple's seven.

Presentation

Each of the add-on cards comes in its own

61 ▶

The assembled system backplanes into the middle distance, and owners of U-Microcomputers' expansion boards for the Spectrum may, in a few short years, be recognised by the way their heads tilt permanently to the left from typing and looking at the screen at the same time.

The whole set-up is gloriously cluttered, and the technical whizz will revel in the detailed information and diagrams in the manuals. Even the novice should find enough there to get something going.

The U-Microcomputers system hides its light under a bushel in several respects, one of the more obvious being the way very little is made of the driver and demonstration software. Mostly, you get a tape with not one but a number of programs on it, and while they do their task effectively and efficiently, some of them also give very polished demonstrations.

There's also lots of scope for rewriting the literature to a 'use and learn' format, which would encourage novices to get more involved in aspects of hardware design.

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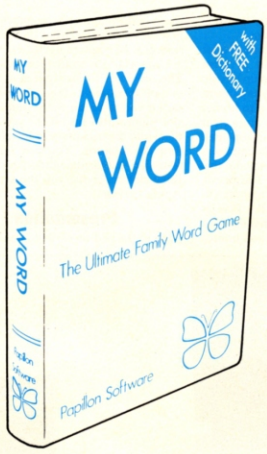

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box, wrapped in metal foil and sandwiched between two large pieces of foam. There is also a tape of driver and demonstration software included, but even so the Centronics kit, which consists of a tape, small piece of cable and two chips, looks pretty bizarre nestling in a 7.25 × 10.5in box.

A brief manual is provided with each unit. The technical information tends to be short on explanation for novices. Someone has obviously mentioned this to the company, because the general purpose parallel card manual's appendix includes a short glossary which defines a printer as a 'device for producing a permanent record of data or programs in readable form.' U-Microcomputers really has got to get together manuals which start from the point of why you want it, what you can do with it, then how you do it.

Construction

The U-Microcomputers range of cards is neatly constructed. The edge connectors are gold plated, which makes for more reliable connections, but they are a bit pricey by Spectrum standards. USP-BBP3, the three slot buffered backplane, costs £35.65, while the dual channel serial interface is £34.50, and the general purpose parallel is £29.90.

They're generally classy pieces of work, with a lot more potential than the conventional interfacing devices you can get, but the danger is that all that power will be locked up in the manuals to all but a few initiates.

On top of this, the assembled structure is a particularly awkward shape. A full seven extra slots means you've got a structure 16in long, just slightly wider than the edge connector, protruding from the back of the Spectrum. The cards themselves bring it up to about 6.75in high.

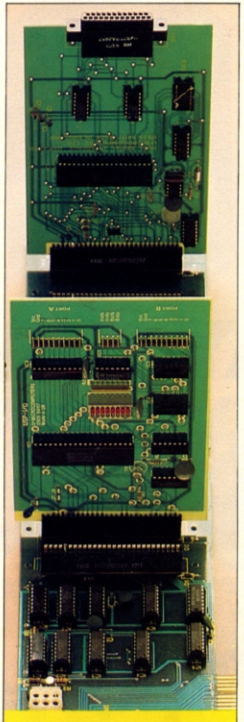
This is logical up to a point, as you could position the Spectrum so that the edifice ran up the right hand side of the TV. But it would be much better to have a system that could be put into a case of sorts, preferably with the whole structure flipped on its side and running along the back of the machine. U-Microcomputers hasn't exactly made this easy, not just because of the overall dimensions, but also because the company has been particularly generous with the overall dimensions of the cards, perhaps to avoid overheating.

In use

Starting at the beginning, you'd use the adaptor to plug in the BBP3 buffered backplane. This provides buffering for the address, data and control lines from the Spectrum's edge connector, together with card slot address decoding for seven cards, and an extra edge connector. This particular edge connector is billed as being for a ZX Printer and/or Microdrives. The latter provokes thoughts of the whole shooting match tilted over to one side, jacked up by the wedge-shaped Interface 1.

I decided not to bother with Microdrives to start with. The next step is to get the thing powered up. The manual warns you against using the Spectrum's own power, and the backplane has its own socket for a power supply. If you can get the right supply for this, you can discard your Spectrum's PSU.

You need to buy a USP-PSU, however, and the company hasn't finished building it yet. If you are electronically inclined you can build your own, but the sort of outputs you'll need are difficult to find. The manual gives you information on how you can link in your own PSU, but the lack of a USP-PSU is a crippling disability for the whole system.



Close-up view of the system. The power supply, when ready, fits in the sockets at the bottom left.

As we've said, you can run the cards individually until the power supply turns up. There's no particular difficulty with this, as there are only three more cards at present, although another five are under design.

The USP-232D is particularly interesting. It's a two channel serial interface used to connect the Spectrum to printers, modems and the like. The A channel provides modem control with split speed working, while the B channel operates as a printer port, with baud rates selectable between 75 and 9600.

The manual here is the most comprehensive of those supplied with the cards, and is helpful in explaining concepts like handshaking. This card needs an extra power supply if you're running it direct off the Spectrum, but this can be supplied by a PP9 battery connected to the specified terminals. Baud rates are set up by placing jumpers across one of the sockets.

There is quite a lot of technical information on the Z80 DART integrated circuit, which is the heart of this particular card, so with the necessary experience you should be able to go considerably beyond LLIST and LPRINT.

The USP-I/O is a general purpose two port parallel I/O board which, in addition to acting as a printer interface, gives you the technology to hook up more esoteric things such as music synthesisers. Again there is a wealth of technical detail, this time on the Z80 PIO. It can be converted to Centronics with the aid of the USP-CENT kit.

Verdict

Despite it's rather odd appearance, this is a system that will allow you to do a lot with the Spectrum. It'll be a hard uphill grind if you want to do much more than run a printer, but it can be done, and if you can handle a soldering iron, it'll be that much easier.

I'm not convinced that the cards for the Spectrum can compete with those available for the Apple. Some of the software supplied is very good indeed, particularly the demonstration of the chip counting its way through binary. A logically presented learn as you go manual would improve matters, but until that happens, it's definitely a system for someone with specialist knowledge.

USP-ADAP adaptor	**£6.90**
USP-BBP3 3 slot backplane	**£35.65**
USP-BPE4 4 slot backplane extension	**£25.30**
USP-PROT prototyping card	**£13.80**
USP-232D two channel serial interface	**£34.50**
USP-IO General purpose parrallel card	**£29.90**
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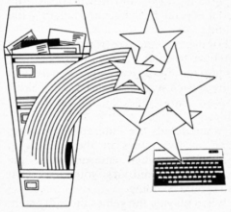


It's not only business users who use databases and electronic card-index systems. They are useful in the home for applications ranging from storing details of computer club members to car components.

Bearing this in mind, it's not surprising that most machines have a host of databases and index systems available. The Oric-1 is no exception; soon after it was launched, Tansoft released its database package, Oric-base (Issue 14).

Now Kenema Associates has released what it calls a utility database for the 48K Oric. Called Filestar, it is advertised as suitable 'for the home, for the hobby, for the business, for many applications'.

Features

One of Filestar's best features is the ability to save and load data via cassette. This may not seem a big deal at first, but it is when you consider that the Oric doesn't have the facility to save and load arrays or data. The new cassette filing features mean that the whole program and data need not be dumped to tape after every session, unlike Oric-base.

The other features of this package are as expected of the average card-index system, which is really what Filestar is; it is not a Database.

Filestar is a menu-driven package with eight main menu options, some of which lead to other commands/menus. The options allow you to create, amend or interrogate files.

When creating a file, you are first given a warning (in case you have a file in memory). From here you set the parameters for the file and its records. The records in Filestar are best imagined as a page (or screen), where up to 16 lines (fields) and 20 characters (field widths) may be specified. Line titles are then required, and the first line (or field) will be treated as the key field (to be used for searching and sorting). The number of records per file is limited only by the amount of user memory available.

Once the file parameters have been set, the file management option allows you to interrogate the file and edit the data. The data in a Filestar file is held in a string array, and when in file management mode you look at the contents of the file in a 'window'. From this option, you can move about the array using a number of single letter commands, and you can change the file and field names as well as print tabulated records or the whole file.

You don't have to specify the maximum number of records per file and you can add to the file from within this option.

All the commands in the file management option are displayed below the file window, and you have everything you would want — except the ability to change the key field.

The Filestar package offers only a minimum of features for searching and sorting data.

From the main menu, you have the options to search for records — by key field and identifier or by record number — and to sort the file into ascending order, by key field.

One of Filestar's most powerful features is the facility to perform a line search whereby the field and data are specified. This can be done for numeric and alphanumeric data, and once the item is found, the keyfield data and record number are displayed.

Presentation

Filestar comes in a book-type case containing the cassette and manual. The manual is a very small, thin-papered affair with seven pages of small print. It soon fell apart from its one staple and does not do justice to the contents, which are quite excellent.

The cassette containing Filestar has two recordings of the program, one in fast speed and the second in slow. Unfortunately, both the recordings are in the same order on the cassette so 300 baud loaders will have to plod through the first recording to find the second.

In use

It's a real pity that both the recordings of Filestar are on the one side as the fast recording would rarely load. Once it did it was normally corrupted and it would have been nice if Kenema had included a redundancy check to see if all was well.

However, once loaded (and working), the main menu is displayed and the top line shows the status for caps and printer, both of which may be toggled.

File creation was simple enough, with a warning message flashing if you held your finger on the keys for too long. My grumble about this section is that there are no editing facilities in this mode. If you make a mistake and don't realise it before you hit the return key, you have to exit from creating the file, enter the file management option, amend the file name and then use the 'A' command to add a record. Things could have been simpler.

In general though, the Filestar package worked fine — for what it is. Accessing the data is simple enough and the window over the array is quite neat.

I was disappointed with the lack of print options. As it is, you can either print a whole record or the whole file, and while the layout is fine, it would have been better if selective printing of fields was offered.

The real pleasure of using the package was in the saving and loading of data. Here, tape speed and tape control are catered for, and when in operation the tape handling messages are similar to the Oric's (status displayed on the top line), so you are never left in the dark when tape operations are in progress.

The speed of operation in Filestar depends on what you are doing.

Thankfully, the line and record search is very fast, but the sorting of the file is not. Being a member of CABS (Campaign Against Bubble Sorts), I was horrified to learn that filestar uses a bubblesort.

It's not too bad when you have one or two records added to the file and you wish to slot them into place by sorting. But having created a file and added numerous records, the time taken to sort the file can be very, very long.

Verdict

For £12 I think Filestar is quite expensive. The fact that it incorporates cassette filing routines doesn't justify the cost since for this sort of money you would expect more facilities, such as selective printing, and a basic interactive query language.

But as a card-index system it's not too bad. It is very easy to use, simple (although slow) in operation, and very secure making it worth considering.

RATING

Features	
Documentation	
Performance	
Usability	
Reliability	
Overall rating	

Name Oric-1 Filestar **Application** Card-index system **System** 48K Oric-1 **Price** £12 **Format** Cassette **Publisher** Kenema Associates, 1 Marlborough Drive, Worle, Avon BS220DQ (0934)516682.

A program needing no programming knowledge brings the arcade to Ted Ball's Spectrum.

Interior design

Several programs produced for the Spectrum make it easier to write games, but with most of them you still have to write the program. The Games Designer, however, allows you to produce arcade-type games at home with no prior programming knowledge.

Features

The games you can set up with Games Designer are restricted to shooting games of the Invaders, Asteroids, Scramble and Berzerk types, but it does allow an enormous variation within these basic types.

You can design sprites on a 12 × 12 grid to represent ships, laser bases, aliens, bombs, missiles, and so on and a large part of the novelty in the games comes from the actual form of the sprites you use. For example, in Halloween, one of the eight sample games included in Games Designer, you have to shoot down witches on broomsticks, devils, bats and similar creatures.

Games Designer allows eight attack waves with different sprites, and for each wave you define the number of aliens that appear and their attributes, such as colour, animation, speed, movement pattern, whether they drop bombs or fire missiles, the score for each alien you destroy — and you can define an animated explosion sequence.

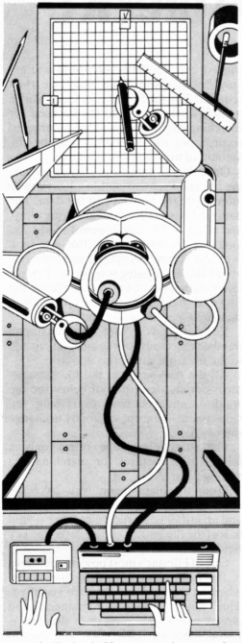
Once you have defined the features of the game, Games Designer handles the running of it. The animation and movement of the aliens, movement of your laser base, missiles hitting aliens or the laser base and the resulting explosion, and sound effects are dealt with automatically.

While playing the games you use keys 6,7,8 and 9 for movement and 0 to fire, which I found rather awkward because the Spectrum's keys are small and close together. However, Games Designer includes software to allow you to use a joystick instead of the keyboard.

After you have designed your game and entered the details you can save it on tape and load it back later, but you do need to load Games Designer before you can reload a game you have saved.

Although Games Designer allows you to put in a lot of variation within the basic format of a game, there are a lot of features of arcade games that you can't put in with Games Designer. For instance, you can have a moving background of stars but no other fixed or moving background; you can have only one kind of alien on the screen at once; only one alien at a time can drop bombs and the same alien will keep on with the bomb dropping until it is destroyed, when another will take up the fight.

The kind of scoring you can have is also



severely limited. You can only score for destroying individual aliens, and there is no way to get bonus scores for completing a screen or series of screens, and no way to get bonus lives for working through enough screens.

Presentation

The cassette is clearly labelled and has the Games Designer program recorded on both sides. It is packaged together with a small printed instruction booklet in a strong plastic book-style box with a wrap-around label.

In use

The concise instructions include all the information you need and tables tell you how to set up various types of aliens. The program works through a menu with numbered options for defining the sprites, the game configuration, the attack waves, and so on, and within each option it is easy to enter the details for your game.

Some of the menu options give you a visual display to work with. For defining the shapes for the sprites you start with a large 12 by 12 grid, select the row by moving the cursor and alter the blocks within the row by typing a series of numbers. You also get a normal size display of the sprite so you can see what it looks like.

When you are setting up the sound effects, for missiles, bombs, ship explosions and alien explosions, you get a display of five slider knobs which you move by pressing keys, and which control the frequency, pitch changes and length of the sound.

For the movement patterns of the aliens you have to enter a string of digits, 0 to 7, for horizontal, vertical and diagonal directions of each step in the movement, and a display shows the overall movement pattern.

Other details are entered as numbers listed in the tables in the instruction booklet, but when entering these the screen is clearly laid out so you can see what you should be doing.

When playing the games the movement is smooth and the speed is very good. The slowest speed is a bit sluggish although still better than you can get from Basic with 20 or more objects moving at the same time. The highest speeds are certainly high enough to present a real challenge.

Reliability

I found no faults in the program, either in the data entry or while playing the games. During the data entry you only need to use a few keys and the program ignores any keys you are not supposed to use.

Verdict

Games Designer is an impressive piece of software, very reliable and easy to use. Unfortunately the resulting games look rather primitive compared with current arcade machines and commercial games programs.

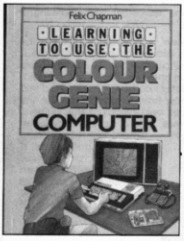
Games Designer is worth getting, provided you don't expect too much from it. You can get a lot of enjoyment from designing the games, and although you will probably find that individual games don't hold your interest for very long, you can use Games Designer to produce hundreds of different games.

RATINGS

Features	
Documentation	
Performance	
Useability	
Reliability	
Overall value	

Name Games Designer **Application** Arcade game generator **System** Spectrum **Price** £14.95 **Publisher** Quicksilva, PO Box 6, Wimbourne, Dorset BH21 7PY **Format** Cassette **Language** Machine code **Outlets** Mail order, shops.

Which book would your micro want you to buy? *PCN*'s review page helps you choose.



'Learning to Use the Colour Genie' by Felix Chapman, published by Gower at £4.95 (paperback, 115 pages).

This is a sort of how-to-bluff-your-way-into-computers. The publisher claims this book plugs a gap in catering for people who have no knowledge of computing but want to learn in a practical, jargon-free way.

It achieves its aims. It is short yet meaty enough. It tells only the bare minimum about the Genie, but after reading this book a complete novice should know enough to read computer magazines or more advanced books with understanding.

In particular, they will have a good basis for comparing the Genie to other machines. Gower has a series of similar books for most current machines, so comparison is easy. And though the style is a little dry it is lucid.

At £4.95 it may be a fraction pricey, but a good book for reference. **JL**

The fun-per-penny ratio is probably the most important criterion for judging games listing books, but there are other ways of sorting out the wheat from the chaff. The clarity of the listings is important, and for the beginner, notes on what the various routines in the programs actually do can be valuable.

'15 Graphic Games for the Spectrum' probably passes on fun-per-penny — you can get books with more games. But in most cases the ones here have an original twist, and old stagers like Hangman don't put in an appearance. You do get City Bomber, Fruit Machine, Surround and Othello, games which no embryonic Spectrum library should be without.

The listings, oddly enough, seem to have been done on a Tandy printer/plotter. This makes them a lot clearer, but it does mean the line length is wrong for the Spectrum, and the user defined graphics are a little odd. These come out in lower case, and are underlined so you know to shift to graphics mode.

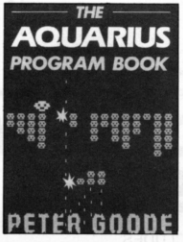
The notes are sketchy. There's enough there for you to be able to type the games in fairly easily, but if you're actually in the market for a book that will give you a games library and teach you about programming, you'd be Micro hobbyists, fascinated by tricks and puzzles, will find many games in this book stibetter looking elsewhere. That said, few program notes means value for money. **JL**

Micro-hobbyists, fascinated by tricks and puzzles, will find many games in this book stimulating, although they might expect more than program listings, brief explanations of how to play them, and occasional modifications to alter ease of play.

A 'Best of Brainteasers' cassette is being released which, at £7.50, represents very good value since presumably it will contain the longer and more interesting programs.

Unfortunately, this book does not give adequate space to explanations of the theories and practicalities of game writing, or how the listed programs work, so tracking errors when entering a listing is not as easy as it might be.

Thus, though providing genuine brainteasers, the cassette of the book is likely to be more useful than the book itself. **PL**



'The Aquarius Program Book' by Peter Goode, published by Phoenix Publishing Association at £4.95 (paperback, 92 pages).

Most software currently available for the Aquarius is relatively costly, so the 45 programs in this book, costing just 11p each, would be a cheap alternative.

The listings, though designed for the machine's small memory of 4K, cover a range of arcade games such as Bombers and Asteroids, and the equally common Hangman, Noughts and Crosses etc.

There are a few art-type programs, one of which displays abstract art and one of which allows you to 'paint'. Utilities such as a binary to decimal (and vice-versa) converter, and a screen routines section are also provided.

With more thought some of the games could have been improved. Number, for instance, could have been used as a basic for teaching a binary search. In this game the computer picks a number and you have to guess what it is. Since it doesn't count the number of guesses you won't discover you can always do it in 7.

Apart from minor irritations this book has a lot to offer, though it can be patronising, *eg:* 'This (program) is only effective as far back as January 1st 1753, which was when the calendar changed to its present form. Of course you knew that didn't you.' **PL**

'Quality Programs for the BBC Micro' by Simon, published by Micro Press at £6.50 (paperback, 207 pages).

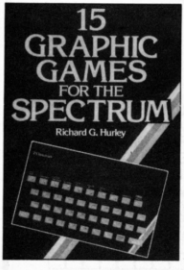
From the opening remark: 'Basic has done more to cripple people's way of thinking than almost any other development in computing' onwards I found this book irresistable. It is a practical introduction to structured programming which makes you laugh while you learn.

The programs included are available on a cassette for £9.50, and if you're going to use this book seriously, it's worth making the investment.

The 18 programs practically demonstrate the value of structured programming and are split into well documented sections.

The section on education, containing three programs, is really only academic rather than a teaching guide. However, the program on speed-reading is excellent.

Other notable programs include telephone costings, fuel consumption, a simulation of Rubik's cube (at last in full colour) and a kaleidoscope. **PL**



'15 Graphic Games for the Spectrum' by Richard Hurley, published by Micro Press at £5.95 (paperback, 115 pages).

'Brainteasers for The BBC and Electron Computers' by G Ludinski, published by Phoenix Publishing Associates at £5.95. (paperback, 129 pages).

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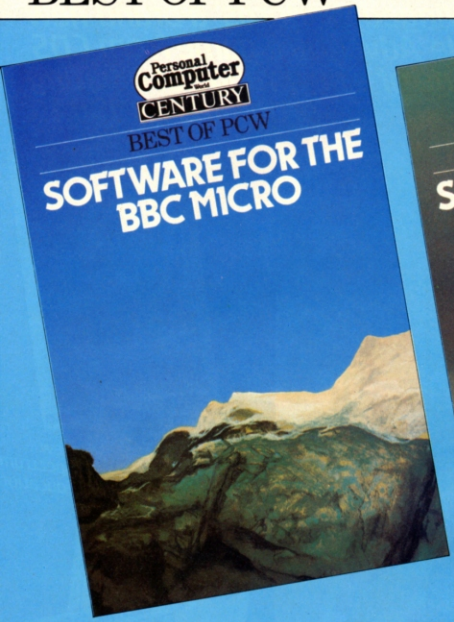

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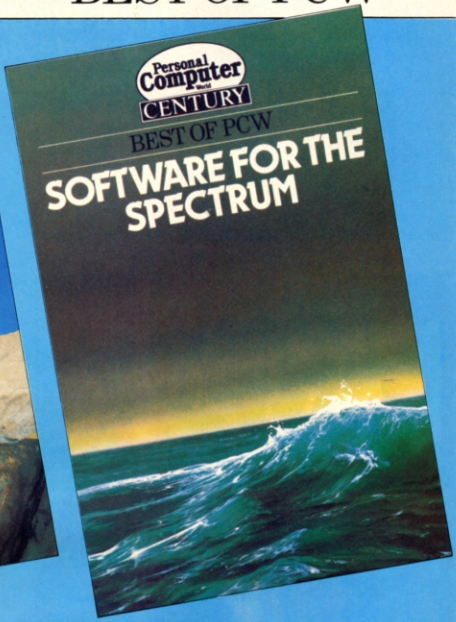

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Commodore 64

Great kick-off

Name International Football **Application** Interactive one or two-player football game **System** Commodore 64 **Price** £15 **Publisher** Commodore, Slough **Format** Cartridge **Language** Assembler **Other versions** None **Outlets** Commodore dealers.

This is a much-awaited program: I first saw it at Christmas 1982, when the footballers merely moved under their own steam and operator intervention was not possible. The interesting fact is that the program is novel; it owes nothing to arcade games. It is a three-dimensional version of a seven-a-side football match, for use on the Commodore 64.

It may be played by one player against the machine, or by two players against one another with the machine keeping the score.

Objectives

The game is played over a 400 unit time-period by using one or two joysticks.

First impressions

This cartridge-based game comes in the usual attractive Commodore packaging, and is reasonably robust. There's a sheet of clear and easy to follow instructions and the game is simple to learn.

In play

At first, two teams' representatives appear on the screen in large size, and you may change their team-colours by using the function keys.

You then use a function key to choose one of nine levels of play if you want to play against the machine. Another function key sets up the game for use with a black and white television.

You press the Fire button, and the action starts. It is immediately obvious this is no ordinary program when the teams run onto the pitch and take up their positions. The three-dimensional pitch is amazingly realistic. Your view is partly from above, as if from the stand, and you can see only the middle of the pitch at this time. The footballers run with realistic action, and the realism is even more marked if you get about three metres from the screen. The perspective of the view is excellent.

The whistle blows, (a remarkably accurate sound) and your game starts. You can move the player nearest to the ball using any position on the joystick, and the footballer you are controlling changes colour for easy identification. Bringing your player into contact with an opponent's player in possession of the ball, leads to a successful tackle. And there are no fouls in the game.

Moving your player enables him to carry the ball once he has possession. When you kick the ball, there is a satisfactory ball meets boot sound.

The high resolution multi-coloured graphics are stunning. As you move your player up and down the pitch, your 3D view is moved sideways, until the goal and goalkeeper come into view.

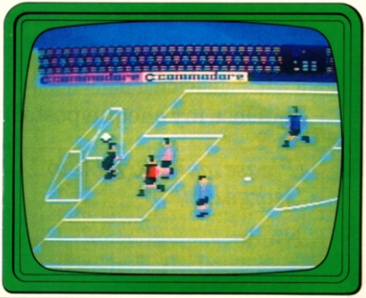
There are some delightful touches, such as advertising boards around the ground and the way the crowd moves and roars. Whenever the ball goes out of play, the nearest player of the appropriate team takes the throw, or corner kick, if you press the Fire button.

The line-up of players for a corner is remarkably realistic, as is the action of the ball. Not only does each bounce produce a satisfying sound, but a shadow moves under it when it's in the air, arriving precisely underneath it when it falls to earth.

You have a degree of control over the goalkeeper. You hit the Fire button and he dives or jumps, according to the type of shot coming at him. Throughout the action, the scores and remaining time are displayed on scoreboards.

At half-time, the players run off the field and reappear after an interval, accompanied by the referee and linesmen.

At the end of the game, the teams leave the field and then return, line up, and the queen presents a cup to the winners.



Verdict

The competition among program designers for the Commodore 64 is now fierce, and this game ups the odds considerably, changing the standards by which 64 games will be judged. The use of colour, sound and high resolution graphics astounds even very experienced users and to the uninitiated, the effects are breathtaking.

There are sufficient levels of difficulty to keep the solitary player happy, and the two-player version, being a game of skill, is highly addictive.

It makes excellent use of the characteristics of the Commodore 64. At only £15 it represents formidable value for money.

Barry Miles

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	

Spectrum

A day at the races

Name Groucho **System** 48K Spectrum **Price** £10 **Publisher** Automata UK Ltd, 27 Highland Road, Portsmouth PO4 9DA **Format** Cassette **Language** Basic **Other versions** None **Outlets** Mail order

Question: How do you follow Pimania, Automata's adventure that's been out about a year but which no one has yet solved? Answer: You come up with another game, but make it slightly easier.

First impressions

Who could resist a loading screen that offers a picture of Groucho wriggling his eyebrows and waggling his cigar?

In play

After dealing with the possibly familiar riddle, 'A key turns the lock,' you'll find yourself in Metroville with 200 cigars to your credit and your quest for clues begins. There are several towns to visit, such as Tinsel Town and Wrinkle City, and a section of each is drawn on your screen, usually a street front of bars, banks, cafes, hotels and so on. Most of these have a movie connection, such as Ricky's Bar or Marlon's Hotel, and your movie knowledge will be tested as Groucho insists on impersonating famous stars from time to time, whose identity you must guess from the clues provided, each one costing you two cigars more than the one before. With up to ten clues and no escape, you can get rid of a lot of cigars, though most of the names you should know and a correct guess wins you one of the 22 clues to the name you're really after.

Nothing is predictable, of course, and Groucho and the Pi-Man pop up all over the place, exchanging insults and knock-knock jokes, offering clues, stealing cigars, and there's even a guest appearance from Pac-Man, who's strayed into the wrong program. They must have used up at least 47½K of memory storing bad jokes. Even when you've entered all the bars in all the towns in Groucho you can still keep going as you don't get the same result each time and clues can turn up anywhere.

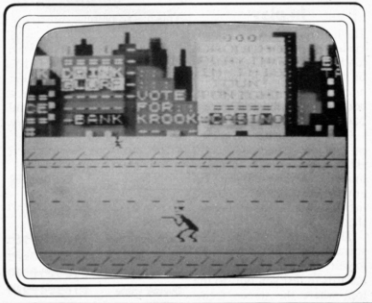
The responses seem rather slow, it takes much too long for the game to get started once loaded, and the music leaves a lot to be desired. But apart from that, the game is great fun, the graphics simple but amusing, and you never quite know what response you're going to get.

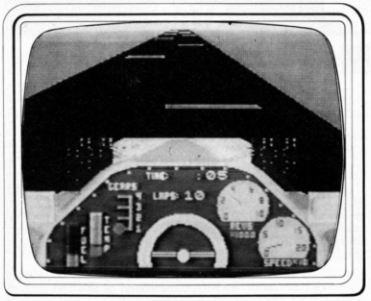
Verdict

Scott Adams it isn't, but Groucho is unique and will be an essential buy for anyone who enjoyed the nonsense of Pimania. After unearthing ten of the clues I have an idea who that mystery star might be . . . so on second thoughts, don't anyone else buy the game, I rather fancy that trip to Hollywood.

Mike Gerrard

RATING	
Lasting appeal	
Playability	
Use of the machine	
Overall value	





Fly the flag

Name Chequered Flag **System** Spectrum **Price** £6.95 **Publisher** Sinclair Research (Psion), 25 Willis Road, Cambridge CB1 2AQ **Format** Cassette **Language** Machine Code **Other versions** None **Outlets** Mail Order/retail

Chequered Flag is here bringing you an almost 3D, real time simulation of, guess what? Driving a racing car!

Objectives

You are a racing driver with six of the world's most famous tracks and four Psion fantasy tracks to choose from.

Not only are you spoilt for choice when it comes to circuits to race on, but you also choose from three different cars.

Unlike real racing, you race against the clock; there are no other cars to slow you down, so your task is to beat the track record for a given circuit. A record is kept throughout the game of all ten of these.

First impressions

The attention to detail in this program is very thorough. Each car is built differently, each track is, of course, unique, your view out of the car even wobbles when you have a puncture.

The documentation consists of five pages of instructions printed on the inlay card. All that you really need remember are the various control keys. The rest of the instructions are duplicated in glorious colour on screen. Another useful feature is the demonstration mode.

In play

If no other game has persuaded you to buy a joystick then this one probably will — however, Psion has made no allowance for it with this software, so if you do buy one with Chequered Flag in mind, get a programmable interface. It is vital if good track times are to be set.

Having loaded a very long lump of machine code you first select your race track, then tell it how many laps you wish to race, and pick your car. Then it's fingers at the ready and wait for the green light.

The accelerator and brake are very responsive but it took quite some time to get used to the steering. Until that time I was forced to put up with a horrible screeching noise while I skidded around virtually every bend. In fact, skids or not, the program makes lots of noises, most of them not very pleasant. There is also a chugging noise that changes pitch with the engine revs. Great, but they can't be turned off!

The graphics are almost up to the 3D arcade driving games standard; almost, but alas, not quite. Chequered Flag's screen resembles that of Zzoom.

Verdict

Once past the initial hurdle of learning to drive, I found this an incredibly addictive game. With ten tracks and three cars there's plenty of variation while the on-track hazards like glass or oil slicks keep you on your toes throughout.

Roger Howarth

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	

ATARI

Maze chase

Name Way Out **System** Atari 800 (48K) **Price** £27.95 **Publisher** Sirius USA (distributed in UK by Centresoft) **Format** Disk **Language** Machine code **Other versions** None **Outlets** Centresoft stockists Midlands DY4 9AH **Format** Disk **Language** Machine code **Other versions** None **Outlets** Centresoft stockists.

Three dimensional maze games aren't news any more. So why was this one recently voted as having the best American computer graphics of the year? Well, this game has two very special features — realistic, high speed movement and a Cleptangle.

Objectives

Simply go into any one of 26 different mazes and find the way out. The door locks behind you as you enter, so forget about sneaking out the way you came in. To help you find the exit, you are supplied with a compass and a mapmaker. Just one snag — the playful Cleptangle scampers about the maze and, given half a chance, runs off with your compass or mapmaker or both. You get them back by chasing and catching up with the Cleptangle — if you can. The wind blows in a constant direction and careful study of native fireflies will help you gauge its direction — it sometimes blows from the way out. It sometimes blows a mite too strong as well.

In play

What you see is a wide-angled, three-dimensional, eye-level view of the section of the maze ahead of you. As you move about, your view of the open-topped maze changes smoothly and accurately with your line of sight, even with the smallest of movements. The effect is awe-inspiring.

Moving the joystick starts you in the chosen direction, your speed picking up automatically. Bump into a wall and you just bounce off with consequent loss of speed.

What sets your pulse racing is the sound of the approaching Cleptangle.

The real fun of this game is chasing the Cleptangle. It gives away its nearby presence by enpitting an alarm and once it's in your view, you must charge off in pursuit, swerving and swivelling at high speed through the maze. The Cleptangle may corner itself in a dead end, whereupon it twirls faster than Jane Torville, and tries to slip by you. If you meet it head on, you get your belongings back and the Cleptangle pushes off.

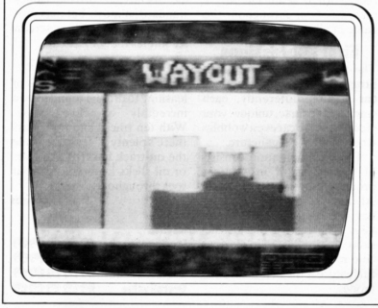
Verdict

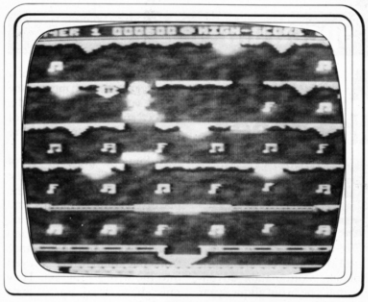
Although the sight of bare maze walls can get a bit monotonous, the realism of movement in the maze never ceases to be astounding. Forget about finding the way out — enjoy a superb high-speed chase after a Cleptangle.

Bob Chappell

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	





Walking boots

Name Jet Boot Jack **System** Atari XL/400/800 **Price** £9.95 **Publisher** English Software, Tel: (061) 835 1358 **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Most retailers

Roller skates were once a craze. Now it's those Walkman radios. Addicted to both speed and sound comes a new breed of hero, Jet Boot Jack.

Objectives

Jack, with his Walkman and rocket-assisted boots, jets around the various platforms of colourful chambers collecting up all the musical notes hanging in the air.

He hitches rides on elevators and moving walkways, while dodging overhanging rocks, plungers and creepy-crawlies. He has a limited amount of power for his boots but replenishes it by bumping into what looks remarkably like quivering blancmange.

In play

The high quality of this game is evident from the start. As it loads, it displays a countdown on screen before launching into an impressive title sequence, complete with musical accompaniment.

Options available include a 1 or 2 player game, 5 different skill levels (plus a practice mode), and the ability to skip any screens already conquered in this session — good thinking, that.

There are ten different screens ranging from the lowest; where there are enough hazards to test you out, to the top; where the screen teems with detailed machinery and monsters.

Jack is a lovingly drawn and animated figure. A fiery exhaust streams from his powered boots as he zooms around.

By moving the joystick with a gentle touch, Jack can do a quick knees-bend, jet to the left or right, and bounce up and down (dislodging any beasties hiding under the floorboards).

Each screen consists of several platforms linked by lifts. The musical notes are suspended in the air — Jack merely has to pass through them.

Monsters go creeping about the place; if Jack bumps into one he loses one of his 5 lives. If one is hanging from the ceiling, he pops up to the floor above and removes the danger by bouncing up and down above — which gains you bonus points, too.

Other hazards include plungers going in and out on the roof, over floors which rush first one way then the other, and fast moving flat transporters. There's a lot to watch out for.

Verdict

This has to be one of the best, most playable and carefully thought-out games for the Atari that I've seen for a while. The fact that it's on cassette rather than disk or cartridge makes it all the more impressive and makes it available to more users. Excellent throughout. English Software has produced a likely chart topper.

Bob Chappell

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	

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Vic-20

The old story

Name Supavaders **System** Commodore Vic 20 **Price** £6.95 **Publisher** K-Tel **Format** Cassette **Language** Machine Code **Other Versions** None **Outlets** Mail order and most dealers.

This is just one of two games on a special Vic 20 pack from K-Tel, a company that is now making its mark in the world of computer software. Supavaders is, as you might guess, a variation on a very old theme.

Objectives

According to the publicity blurb your objective is to secure the future of the earth by destroying the powerful alien force known as the Supavaders. This, so we are told, will require skill and courage.

In play

The instructions state that playing the game will require the cursor keys, but after rapidly losing many a life you discover that they really mean the 'less than' and 'greater than' keys. Let's hope the final documentation is an improvement over the initial samples we had for review.

Four other keys allow you to fire left, right, up and down, since these aliens are intelligent. They have baby aliens, who live on the surface of the planet. They don't seem to do very much, but it is disconcerting to see hordes of the beady-eyed little devils hopping up and down underneath you.

A number of innovations make this one stand out from the usual run-of-the-mill variations on a Space Invaders theme. The major improvement is a sideways scrolling screen that allows you to move off the screen to left and right and follow the aliens as they bob about at the top of the screen.

Thankfully they don't get any lower as time moves on, but every now and again one of them will leave the main formation and fall down to earth. If this doesn't happen on the screen window you're looking at you'll soon hear about it, as they make a dreadful whine whilst falling to the surface of the planet.

If an alien makes it to the surface before you shoot it down it leaves a number of little aliens sitting at the bottom of the screen.

Apart from that the rest of its is pretty much standard Space Invaders fare: fun at first, but ultimately boring.

Verdict

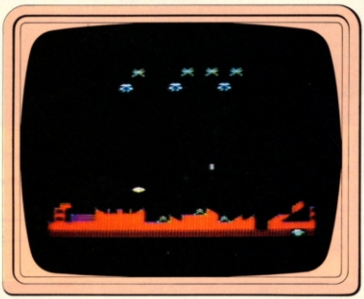
A reasonable enough version of the old classic, and you do get another program on the reverse side of the tape. This is called Bomber Run, and is presumably written by the same author, as it shares many features with Supavaders.

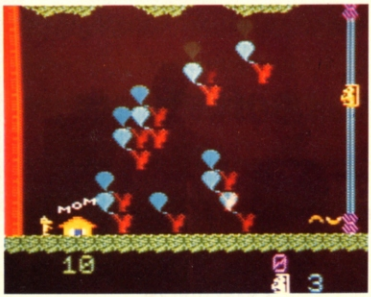
Competent, but nothing brilliant.

Pete Gerrard

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	





A rueful swagger

Name Outback **System** Commodore Vic 20 **Price** £5.50 **Publisher** Paramount Software, 67 Bishopton Lane, Stockton, Cleveland **Format** Cassette **Language** Machine Code **Other Versions** None **Outlet** Mail order and most dealers.

A game for conservation lovers everywhere. To the tune of Waltzing Matilda, a tube of Fosters by your side, your job as 'Boss Roo' is to defend a herd of baby kangaroos from kidnap by cunning swagmen.

Objectives

Cunning is the word. Knowing that your compound of tiny roos is heavily guarded, they've had the bright idea of coming in from the trees on balloons. Every swagman that lands steals one of your roos, and so you've had to devise an extraordinary way of guarding them.

A special pulley system with a platform on it has been built, and you have to ride up and down on the platform, shooting arrows at the balloons and hopefully exploding them. Thus a swagman plunges to his doom, and the baby animals are safe . . . until the next one comes along.

Should you miss the balloon and hit a swagman instead, he responds by instantly throwing a boomerang at you. Not very well it must be admitted, since it doesn't seem to come back to him, but if it hits you another of your four lives disappears.

After each wave of swagmen has been seen off various bonus points are scored, and you get a number of extra baby kangaroos to look after. It's all over when you lose all your lives, or all of the babies have been stolen.

In play

For a program that works on the unexpanded Vic, there's a surprising amount going on.

There's also a lot of good programming. Nice graphics are much in evidence as the swagmen descend, sometimes in pairs to make it more difficult to hit the balloons, and almost always zig-zagging from side to side. By the time you've got three or four of them on the screen a veritable fusillade of boomerangs starts flying about, and the pulley system is put to a severe test as you try and dodge out of the way of everything.

The sound effects are more than reasonable as well, although you'll probably be reaching for the volume control before too long.

Should you manage to survive three waves of the invading swagmen a bonus of 10 baby kangaroos is given, and if you ever manage to reach 20,000 points you get a bonus life thrown in as well.

Verdict

With a very good response to joystick movement, this is an addictive game that makes nice use of the features of the Vic 20. You can almost forget you're using a 22 column screen, as the graphics are very good indeed.

Lots of fun for the unexpanded Vic.

Pete Gerrard

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	

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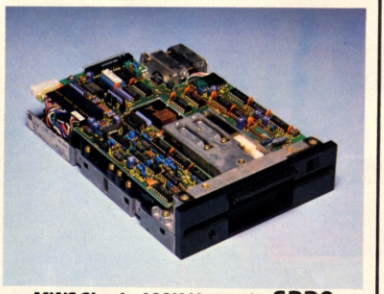

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Dragon 32

Bats and bullets

Name Danger Ranger **System** Dragon 32, 1 joystick **Price** £8 **Publisher** Microdeal, 41 Truro Road, St Austell, Cornwall **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Mail order, most retail.

This excellent game shows that Microdeal still have the pick of American software that can be imported and converted from Tandy to Dragon.

Objectives

Your joystick controls a man, whose aim in life is to first collect keys and then discover the treasure chests to unlock them.

In play

The first screen has five platforms, each with a key at either end, and with one or two holes dropping through to the platform beneath. You start at the top and collect all the keys in order to get through to the second screen where the chests are waiting. The first problem you face is the fact that bats are fluttering round on some of the platforms. You have to shoot these or avoid them.

A worse problem is that moving up and down at each side of the screen are what appear to be tin cans, though don't let appearances fool you as these can shoot to kill. If you hit them first they burst into flames and sink to the floor, but a replacement is never far behind.

On the second screen there are several rows of what look like squashed aliens arranged as stepping stones, and you must run across these while avoiding the lasers that move up and down the screen. At the end of each row you can jump to the one beneath, picking up a treasure chest as you go. But there are also several devil masks which act as obstacles. While you can shoot these, your gun has only a short range and you must brave the lasers to get close enough to do so. Running across the top and bottom rows is the hardest part because the lasers appear above and below you with hardly any warning.

If you get to the end of the second screen, what's your reward? Why, you're back to the first screen again only with more bats and more bullets, which this time are sprayed about so that new tactics are called for. If I'd been able to work out what they were I could tell you what lay beyond that, but I haven't and I can't. You want to discover some of the surprises for yourself, don't you?

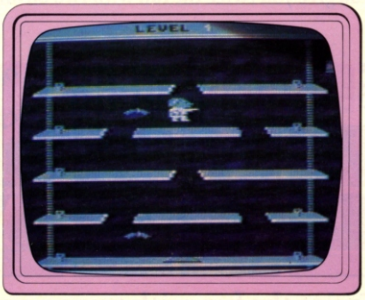
Verdict

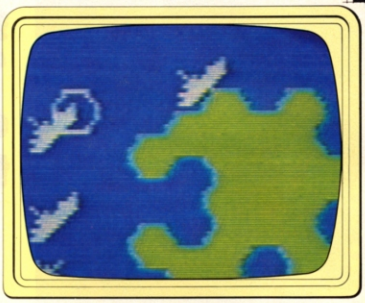
Microdeal's *The King* dominated the 1983 Dragon software charts; is *Danger Ranger* set to do the same for 1984? It's certainly good enough.

Mike Gerrard

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	





Convoy command

Name Up Periscope **System** Dragon 32 **Price** £6.95 **Publisher** Beyond Software **Format** Cassette **Language** Basic **Other versions** None **Outlets** Mail order

Strategy games are a good way of using a computer's ability to process a range of information simultaneously, and if you add their graphics capabilities you can come up with something like Up Periscope.

Objectives

One player is in command of the ships, six destroyers trying to guide six convoy ships across the map displayed on the screen, while the second player (or the computer in a one-player game) takes charge of ten submarines which attempt to stop them.

You can alter the number of subs from one to ten, and the number of ships that must cross safely from one to six, with three being the default value. There's also a time limit in which the ships must cross safely, otherwise the submarines win.

First impressions

One look at the eight pages of rules and you think you're never going to learn how to play the game. They are in fact very badly organised, but in practice the game proves easy to learn simply by playing it.

In play

The submarines make the first move. Your options on each move are always displayed at the foot of the screen. In addition to moving forwards the submarines also move up or down a level, or fire a torpedo. Only submarines on the surface can be seen by the ships, although one of their options is to use their sonar to detect the presence of a submarine, which might then be dispatched with a depth charge. Control is by cursor keys or joystick.

This is Battleships in 3-D. After the subs have moved the destroyers take their turn to move forward, reverse, or turn clockwise or anti-clockwise. The ships are deliberately placed at an angle so that you have to manoeuvre them round the island in the centre of the battle area, which overspills the screen on all sides.

The convoy vessels are then moved, these having no defence but just the ability to move in any of the six directions indicated by the arrows at the foot of the screen.

At the end of each round of moves a status report is displayed.

The graphics on Up Periscope are rather limited, and the fact that it's written in Basic does show in some of the responses. But this doesn't detract from what is, after all, meant to be a slow, tactical game.

Verdict

This may not be the greatest of games, but it's better than average and should appeal to the strategy fans.

Mike Gerrard

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	

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If your association has something special on the agenda or if you've just started a new one, contact us at *Clubnet, Personal Computer News*, VNU, 62 Oxford Street, London W1A 2HG.

Club in a hi-tech area

Into only its second meeting, Elsenham Computer Club in Essex already has the year's program running, with talks, lectures, and it hopes, demonstations from local dealers. There's also less serious stuff: an adventure games helpline for those members 'stuck in the trolls cavern'.

Although it is early days yet, club hardware seems to be dominated by Sinclair's Spectrum and ZX81, but other makes are represented, says chairman Ray Franklin, including Commodore, BBC, Sharp and Texas Instruments. Club records are kept on Ray's Spectrum.

It is a surprise perhaps that a club, especially one so new, in this small village on the Hertfordshire-Essex border en-route to Cambridge, should have attracted over 30 people. Ray Franklin puts it down to the local primary school, which has recently bought a BBC computer, firing the enthusiasm of pupils and parents alike.

Ray, himself a school governor and parish councillor, explains that he formed the club in self-defence because, like other more senior members, he wanted to learn the secrets of computing so rapidly acquired by the kids.

The club's membership has a mixture of computing experience to draw upon, from the pure hobbyist to those in the industry — one even has his own software house. Being so close to Harrow, says Ray, means there is more than the average number of people working with computers locally.

Once the club is firmly established they hope to make more use of these skills. Already members are getting together between meetings to swap experiences and programs.

Club members playing games on a Commodore microcomputer.

There is no doubt that they are off to a good start. The first meeting in October saw a lecture from local computer consultant Robin Shaw on the history of computers. November's practical talk on debugging was given by a club member.

Elsenham's club produces its own free newsletter, reporting coming events and reviewing software. It will later carry reports of talks and lectures, as well as the advertisements of members selling equipment. The club itself already sells cut-price tapes to help budding programmers.

Ray says that he hopes to expand correspondence with other clubs in the surrounding area. Manufacturers and dealers have already been quite helpful in providing information and pamphlets, he says.

Paul Strohm

Name Elsenham Computer Club **Venue** New Village Hall, High Street, Elsenham **Meetings** Second Tuesday in the month, 8.30pm to 10.30pm **Contact** Ray Franklin, (0279) 815088.

CLUBS

AVON

Bristol Berkeley Nuclear Laboratories Club. Contact Neil Walker, 53 Wolfridge Ride, Alveston, Bristol, 0454 414262.

Bristol Micro Computer Club. Meets at the Pavilion, Southend Road, Filton, Bristol, every other Tuesday. Darryl Collins, 60 Mackie Rd, Filton, Bristol BS12 7NA, 0272 792982.

Bristol Format 40/80 Disc Club, for BBC disk users. Contact Peter Hughes, Format 40/80 Disc Club, c/o The Lending Library, Five Marshal Street, Bristol BS1 4AA.

Multi-User Club Valerie Boyde-Shaw, Nailsea 851337.

Worle Computer Club. Meets at Woodsprings Inn Functions Rooms on alternate Mondays at 7-10. 30pm. H Bennett, 0934 514902 or F Feeney, 0934 833122.

BEDFORDSHIRE

Bedford Amateur Computer Club. Meets at Star Rowing Club, Bedford, on the first and third Tuesday of month 8pm. Rowan Bird, 74 High Street, Great Barford, MK44 3LB, 0234 870763.

Chiltern Computer Club. Meets at Five Bells, Eaton Bray, Near Dunstable, Leighton Buzzard on second and fourth Monday of each month. Contact Steve Betts, 42 Wallace Road, Eaton Bray, OU6 2DF, 0525 220922.

Luton College Computer Club. John Rodger, 0582 3411.

Luton Computer Club. J P Fletcher, 1 Trowbridge Gardens, Luton, LU2 7JY, 0582 450687.

BERKSHIRE

Bracknell Computer Club meets second and fourth Thursday of each month at Easthampstead Community Centre, 7pm. Contact Paul Tilsley, 31 Pembroke, Hanworth, Bracknell, Berkshire.

Easthampstead Computer Club. Meets at Easthampstead Park School, Bracknell, on the first Wednesday in month at 8pm. Brian Poulton, 0344 84423.

Crown Wood Computer Club. Meets at Crown Wood Community Centre, Bracknell, each Thursday at 8pm. Ray Ayrton 0344 59264.

BIRMINGHAM

Birmingham Amateur Computer Club. Meets at Free Church Hall, Land Lane, Marston Green, Birmingham on first and third Thursday of each month at 7.30pm. Contact Les Moore, Secretary, Wolverhampton 725340.

Primrose Hill Centre Micro Club. Meets Wednesday at 7.15pm at the Primrose Hill Centre, Shannon Road, Kings Norton, Birmingham. Contact Keith Belfield. Tel: 021-459 8995.

BUCKINGHAMSHIRE

Aylesbury Computer Club. Meets at Quarrendon Youth Club every Friday at 7.30pm and at Mandsville County Secondary School the first Thursday of each month at 7pm. Ken Knight, 22 Mount Street, Aylesbury, 0296 5181.

Chiltern Microcomputer Club. Meets at the Garden Centre, School Lane, Chalfont St Giles, on the first Wednesday of each month. Mrs W Tibbitts, Elwood, Deanway, Chalfont St Giles, 0241 07 4906.

Iver Computer Club. P A Seal, 1 Ormonde Flats, Church Road, Iver Heath, 0753 652792.

Iver Computer Society meets at Huntsmoor room, Iver Village Hall on the second and fourth Thursday every month at 7.30. John Haigh, 141 Leas Drive, Iver, SL0 9RP.

CAMBRIDGESHIRE

Cambridge Microcomputer Club, meets on the third Wednesday of month. Derek Tripp, 3 Spurgeons Avenue, Waterbeach. 0223 315662.

Peterborough Personal Computer Club meets at Crosfield Electronics Social Club, fortnightly on Mondays. Andrew Pike, 0733 44342 after 5pm.

CHESHIRE

Altrincham Computer Club. Meets at N. Cestrian Grammar School, Durham Road, Altrincham, fortnightly. Martin Hickling, 39 Barrington Road, Altrincham, WA14 1H2, 061 941 4547.

Bruneil Computer Club. Meets at St Werburgh Community Centre on alternate Wednesdays at 7 to 10pm. Mr R Simpson, 4 The Coots, Stockwood.

Chester Computer Club. Contact W Collins, 37 Garden Lane, Chester, Cheshire.

Crewe Computer Users Club meets at Buffaloes Club, Earl Street, Crewe, on the third Thursday of each month at 8pm. Bram Knight, 0270 623375.

Holmes Chapel Micro Club meets at Leisure Centre, Holmes Chapel at 7.30 to 9.30pm on the first and third Tuesday of month. Margaret Baker, 1 Helton Close, Crewe. 0477 34238.

Kinder Peek Computer Club meets at Bew Mills School every Monday. John Eary, New Mills 43870.

Kettleshulme National Computer Buyer's Club. Send SAE to Barry Edwards, Laneside House, Paddock Lane, Kettleshulme, nr Stockport, Cheshire.

New Mills & District PCC meets at New Mills School, fortnightly on Fridays at 7 to 9.30pm. Mr G M Flanagan, 11 Sundown Close, New Mills, Stockport, SK12 3DH, 0663 44051.

Northwest Computer Club meets fortnightly. John Lightfoot, 13 Aston Drive, Frodsham, Warrington, WA6 7PU. 0728 31519.

Northwest Computer Club, weekly meetings. Tom Wyatt, 29 Summer Lane, Halton, Runcorn Cheshire WA7 5PG. Runcorn 77545.

Mid-Cheshire Computer Club meets at Winsford Library on the second Friday every month at 7.30pm. Simon Sadler, Winsford 53339.

Stockport Software Exchange Club. Send SAE to P Redford, 53 Cavendish Road, Hazel Grove, Stockport, Cheshire.

CLEVELAND

Cleveland Micro Club meets on the second and third Tuesday of each month, under 18s on second of month, over 21s on third Tuesday of month. J Telford, 13 Weston Crescent, Norton.

Stockton Amateur Computer Club meets at YMCA, Stockton, each alternate week at 7-9pm. Peter Cheshire, 60 Croft Road, Eaglescliffe, Stockton-on-Tees, TS16 0DY.

CORNWALL

Cornish Radio Amateur Club — Computing Section. Bob Reason, 24 Mitchell Road, Camborne.

Cornwall Area PAICC meets at the Penzance Micro Centre every Friday. S Zenith. Hayle 754845.

St Austell Computer Club and Computer Town meets at EGIP Labs, Penpewan Road, fortnightly on Mondays at 7.30pm. N G Day, 2 Clendale Close, St Austell.

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CUMBRIA

Ambleside Computer Club. Contact Jeremy Westerman, 8 Hill Top Road, Ambleside, Cumbria. Tel: Ambleside 2452.

DERBYSHIRE

Chesterfield Micro Club. Meets each Friday at 7pm. John Charter 37555 or Alan Crofts 30262.

Derby Micro Society meets at Littleover Church Hall, Sheperd Street, first and third Thursday of each month at 7pm. Frank Taylor, 0332 559334.

Glossop Computer Club. John Dearn, 2 Spinney Close, Glossop.

DEVON

Adventure Helpline Club for desperate adventurers. Contact C.P. Wong, 20 Stangray Avenue, Plymouth, Devon.

Brixham Computer Users Club. Meets at Computer Systems (Torbay), Pump Street, Brixham, Saturdays at 2.30pm. Ian Chipperfield, 22 Brookdale Court, Brixham, Devon (Brixham 59224).

Computers Against the Bomb. Contact Paul Couchman, 29 Clifton Place, North Hill, Plymouth, Devon.

Exeter & District Computer Club meets at Exeter School, Magdalene Road, Exeter, on the second and fourth Tuesday every month. T G Holden, 14 Greenville Avenue, Teignmouth, TQ14 9NT.

Exeter & District Amateur Computer Club meets second Tuesday every month. Doug Bates, Fortescue House, Stoke Cannon, Exeter. Specialist meetings on third and fourth Tuesday.

Okehampton Computer Club. Contact Cherri Graebe, Okehampton 3523, or Okehampton Community College, Okehampton 3800. Meets 7pm each Monday during term time.

South Molton Computer Club. Meets at South Molton Tool Hire, Dootson House, Cooks Cross Industrial Estate, South Molton, North Devon, each Thursday at 7pm. Contact Nick Hews on 07695 3446.

Torbay Users Computer Club meets at Devon Computers, 39 Totnes Road, Paignton on Mondays fortnightly.

DORSET

Bournemouth Area Computer Club meets at Kinson Community Centre on the third Wednesday every month. Peter Hibbs, 54 Runnymede Avenue, Bournemouth, BH11 9SE. 0202 576547.

TOPIC meets at Canteen English Truck Centre on the second and fourth Wednesday every month at 7pm. David Washford, 1 Alexander Road, Bournemouth, BH6 5JA.

Purbeck Computer Club, contact 31 North Street, Wareham, Dorset BH20 1AD.

DURHAM

Darlington Computer Club, weekly meetings. L Boxell, 8 Vane Terrace, Darlington DL3 7AT. 0325 67766.

ESSEX

Genius Computer Club. 30 Webber House, North Street, Barking.

Great Dunmow Computer Club. Contact T Coombs, 4 Oakroyal House, Oakroyal Avenue, Great Dunmow, Essex CM6 1HQ.

Brentwood Amateur Microcomputer Club, meets once a month. A R Holland, 0277 221620.

Springfield Computer Club meets on the first Friday of every month. Stephen Cousines, 1 Aldeburgh Way, Springfield, Chelmsford, CM1 5PB. 0245 50155.

Canvey Computer Club. Contact Dean Williams, 17 Mornington Road, Canvey Island, Essex SS8 8AT.

Colchester Microprocessor Group meets at University of Essex on the second and fourth Wednesday of every month at 7.30pm. Information Centre, University of Essex, near Colchester.

Colchester Computer Society. Meets at Severalls Hospital Social Club, Colchester. Contact A Potten, 14 Foxmead, Rivenhall, Witham, Essex CM8 3HD, Witham 516335.

Elsenham Computer Club meets on first Tuesday of each month. Contact Ray Franklin on 0279 815088.

National Westminster Personal Computer Society, 412 Eastern Avenue, Gants Hill, Ilford. P J Moore, 01-554 9699.

Stanway School Computing Club, only school members at present. G Floyd, c/o Physics Department, Stanway School, Stanway, Colchester.

Modem 80 Computer Link Club, meets Wednesday evenings. Contact E Ferrant, 55 South Street, Barming, Kent, 0622 27885.

Nailsea Multi-User Club. Contact Valerie Boyde-Shaw, 0272 851337.

Romford Club, a new club. Mr D Norden, 138c Church Road, Romford.

Roundacre Micro Computer Users Club. Meets at the Roundacre Youth House, Laindon Link, Basildon every Wednesday at 7.30pm. Contact Mrs L Daden, Basildon 285119.

South East Essex Computer Society meets at Hockey Club at Roots Hall, near Southend Football Stadium on Wednesday at 7.30pm. Robin Knight, 128 Little Wakering Road, Little Wakering, Southend-on-Sea. 0702 218456.

GLOUCESTERSHIRE

British Amateur Electronics Club. Mr J Margetts, 3 Bishopstone Close, Golden Valley, Cheltenham.

Cheltenham Amateur Computer Club meets on the third Tuesday of each month at 7.30pm. Mike Pullin 0242 25617.

GCHQ. D W Adam, 16 Court Road, Prestbury, Cheltenham.

Cheltenham Amateur Computer Club meets at Prestbury Scout Headquarters, on the third Tuesday of every month at 7.30pm. M Hughes, 36 Riverviews Way, Cheltenham.

HAMPSHIRE

Commodore Computer Club. Meets on the first Friday of every month at Bury House, Gosport Community Centre, Bury Road, Gosport at 7pm. Brian Cox. Fareham 280530.

Fareham and Portsmouth Amateur Computer Club. Alan Smith, c/o Francis Close, Lee-on-the-Solent, Gosport, Hants PO13 8HB. 0705 550907.

RAF Odiham Computer Club. Contact c/o Officer i/c, Royal Air Force, Odiham, Nr Basingstoke, Hants.

Southampton Amateur Computer Club meets at Crestwood Centre, Shakespeare Road, Boyatt Wood, Eastleigh, Hants. on the second Wednesday of every month at 7.30pm. Paul Blitz. Chandlers Ford 69050.

HEREFORD

Hereford Amateur Computer Club, proposed new club. Stuart Edinborough, 2 Warwick Walk, Bobblestock, HR4 9TG. 0432 269700.

HERTS

Elsenham Computer Club. Meets on second Wednesday of each month at the New Village Hall Committee Room, Elsenham, Bishop's Stortford. R. Franklin 0279 815088.

Sawbridgeworth Computer Club, meets at Sawbridgeworth Parish Hall, 7pm, Fridays. M. Marwood, 38 Sayesbury Road, Sawbridgeworth, Herts, CM21 0EB.

HUMBERSIDE

Bridlington Microcomputer Club. Meets 7.30pm alternate Fridays at Old Star Inn, High Street, Bridlington. Contact D Compleman, 0262-601859.

Grimsby Computer Club meets at Grimsby Central Library fortnightly on Mondays at 7.30pm. Ian Fell, 0472 49248.

Scunthorpe & District Microprocessor Society meets at Community Centre, Lindun Street, Scunthorpe, every Tuesday at 7.30pm. G Hinch, 21 Old Crosby, Scunthorpe, South Humberside DN15 8PU.

KENT

Canterbury ACC proposed new club. Contact L Fisher, 21 Manwood Avenue, St Stephens, Canterbury, CT2 7AH.

Gravesend Computer Club. Meets at School Room Extra Tuition Centre, 39 The Terrace, Gravesend. Contact c/o The Extra Tuition Centre, 0474 50677.

Medway Amateur Computer & Robotics Organisation. Meets at 7.30pm on first Tuesday and third Wednesday of every month. Annual subs £5. Contact Paul Cameron, Unit 3, Walderslade Centre, Walderslade Road, Chatham, Kent, 0634-63036.

North Kent Amateur Computer Club meets at Lecture Theatre, Charles Darwin School, Jail Lane, Biggin Hill, on the first Thursday of every month at 7.30pm. Iain House, 28 Canadian Avenue, Catford SE6 3AS. 01-690 5441.

Orpington Computer Club meets at The Large Hall, Christ Church, Chaterhouse Road, Orpington, every Friday at 8pm-10.30pm. Mr R Pyatt, 23 Arundel Drive, Orpington, Kent BR6 9JF. Orpington 20281.

National Personal Computer User Association. Eric Keeley, 11 Spratling Street, Manston, Ramsgate, Kent.

Sevenoaks School Computer Club. G Sommerhoff, Technical Centre, Sevenoaks School, Sevenoaks, Kent. 0732 456340.

Tonbridge & Tunbridge Wells ACC. Ray Szatkowski, 1 Cromer Street, Tonbridge. 0732 355960.

LANCASHIRE

Blackburn Micro Computer Club. Roger Longworth, 12 Sharp Close, Accrington.

Bolton Computer Club meets at Bolton Institute of Higher Education, Deane Road, Bolton, on Thursdays. Bill or Suzi Hatton, 0204 792803.

Burnley Computer Club. Meets at Burnley Technical College on Tuesdays, 7.30-11pm. Contact Clive Tallon, 27 Basnett Street, Burnley, Lancs.

Chorley Computer Club meets at Townley Arms, Chorley, every other Tuesday at 8pm. Tony Higson, 23 Brock Road, Chorley, Lancs. Chorley 68429.

Ribble Valley Computer Club meets at Staff Canteen, Pendle Carpets Ltd, West Bradford, on the second and fourth Monday of month at 7-9pm. Contact Ian Thornton-Bryar, 25 Southfield Drive, West Bradford, Clitheroe, BB7 4TU.

Lancaster & Morecambe Computer Club. Sarah Blackler. 0524 33553.

South Chadderton Computer Club meets at Turf Lane Centre, Turf Lane, Chadderton, on Thursdays at 7-9.30pm. David Sholes, 18 Beech Avenue, Oldham, Lancs.

LEICESTERSHIRE

East Leake Computer Club. Andrew Jones, 59 Bateman Road, East Leake, Loughborough, LE12 6NN.

Hawker Siddeley Computer Club. Contact R Wrathall, 6 Naseby Drive, Loughborough LE11 0WU.

LINCOLNSHIRE

Lincoln Computer Club, meets at The Cardinal's Hat, 238 High Street, Lincoln (entrance on Grantham Street) on first and third Wednesday of each month, except August. Contact Jeffrey Joy, 23 Cross O'Cliff Hill, Lincoln, 0522 28252.

Skegness Computer Club, meets at County Hotel every other Monday, 7.30-9.30pm. Reg Potter, 118 Beresford Avenue, Skegness. 0754 3594.

LONDON

Association of Computer Clubs. Contact Rupert Steele, 17 Lawrie Park Crescent, London SE26, 01-778 6824. National Club.

Croydon Microcomputer Club. Meets at Croydon Central Reference Library. Contact Vernon Gifford, 01-653 3207.

East London Amateur Computer Club meets at Harrow Green Library, Cathall Road, E11, on the second and fourth Tuesday of month at 7-10pm. Fred Linger on 01-554 3288.

Forum-80 London. Leon Jay, 01-286 6207.

Forum-80 Wembley. Victor Saleh, 01-902 2546.

The Foundation, c/o Princes Street, Tottenham, London N17. Postal club for science fiction/fantasy software. Contact David Hodson, 01-808 4053.

Harrow Computer Group meets at Harrow College of Higher Education, Room W24, Northwick Park, on alternate Wednesday at 7pm. Bazyle Butcher, 01-950 7068.

Imperial College Micro Club meets at room 401 in the Royal School of Mines on Wednesdays at 2pm. Jan-Simon Pendry, Micro Club, c/o Imperial College Union Office, Prince Consort Road, London SW7 2BB.

London School Computer Club. Burlington Danes School, Dane Building, DuCane Road, Hammersmith.

Metropolitan Police Amateur Computing Club meets on the first Thursday of month at 7pm. S Farley, 01-725 2428.

68 Microgroup meets at Regents Park Library, Robert Street, NW1, on the third Tuesday of month at 7.30pm. Jim Anderson, 41 Pebworth Road, Harrow, Middlesex.

North London Computer Club meets at the Polytechnic of North London, Holloway, N7 8DB, on Monday, Tuesday, Wednesday and Thursday during term time and one evening a week during holidays. Robin Bradbeer, 01-607 2789.

Paddington Computer Club meets at Paddington College, 25 Paddington Green, W2 1NB. Peter Hill, 01-723 5762.

Post Office HQ Microcomputer Club meets at room B145, River Plate House, 12-13 South Place, off Moorgate, on the second Thursday of month. Vernon Quaintance, British Telecom Enterprises, Cheapside House, 138 Cheapside EC2U 6JH. 01-726 4716.

Queens Crescent Computer Club. Meets at Queens Crescent Library, 165 Queens Crescent, London NW5, 01-485 4551.

The SOBAT Computer Club meets once a fortnight. Mr T Kayani, 12 Calderon Road, London E11.

South East London Microcomputer Club meets at Thames Polytechnic, Greens Ends, Woolwich SE18, on alternate Wednesdays at 7pm. Peter Phillipps, 61 Graigerne Road, SE3. 01-853 5829.

Southgate Microcomputer Club meets at Room B106 Southgate Tech, fortnightly on Wednesdays at 7.30pm. Kevin Pretorius 01-882 2282. See Prestel page 25820645.

West London Personal Computer Club meets at Back room, Fox & Goose pub, Hanger Lane, Alperton, on the first Tuesday of month at 7.45pm. Graham Brain, 01-997 8986.

MANCHESTER

Manchester Computer Club meets at the Department of Computer Science, Manchester University, Oxford Road, on the first and third Thursday of month at 7.30pm. David Wade, 061-941 2486.

Small Business Computer Users Club. Proposed new club to meet the last Tuesday of month. K Wadsworth, 061-740 7232 after 5pm.

South Trafford Microcomputer Club. Meets fortnightly. Contact Ian White, 16 Leicester Avenue, Timperley, Altrincham WA15 6HR, 061-969 2080.

MERSEYSIDE

Merseyside Microcomputer Group meets at Merchant Taylor's School, Crosby, on second Thursday month. Mr F Shaw, 14 Albany Avenue, Eccleston Park, Prescot. 051-426 5536.

Southport Computer Club meets weekly. Ian Bristone, 28 Weld Road, Southport, Merseyside PR8 2DL. 0704 64524.

Wirral Microcomputer Users Group meets at Birkenhead Technical College every Monday. J Phillips, 14 Helton Close, Birkenhead, Merseyside L43 9HP.

Wirral Computer Club. Contact Gary Metcalfe, 24 Marlston Avenue, Irby, Merseyside.

MIDDLESEX

Brigadier Computer Club. Meets on the first and third Monday of every month at Brigadier Youth Centre, Brigadier Hill, Enfield at 7.30 pm. Contact Steve Ward, 28 Brodie Road, Enfield, Middx EN2 0EU, 01-363 3786.

Micromodeller User Association. Meets three times a year. Contact Phillip Matthews, Phillip Morris House, 21 High Street, Feltham TW13 4AD. 01-751 6388.

Sunbury Computer Club meets at St Benedicts Hall, Napier Road, Ashford, on the last Tuesday of month at 8pm. Simon Taylor, 8 Priory Close, Sunbury-on-Thames, Middlesex. Simon Clark, 83 Watling Street, Towcester, Northants NW12 7AG.

Middlesex Micro Club. Contact Pete Kavner, 17 Manor Vale, Brentford, Middlesex.

NORTHAMPTONSHIRE

Corby Universal Micro Club. Meets at Lodge Park Sports Centre fortnightly on alternate Wednesdays and Thursdays. Contact Peter Wilson, 26 North Cape Walk, Corby, tel: Great Oakley 742622.

Kettering Microcomputer Club. Meets every Wednesday at 7pm. Details from Stephen Bickle on 0536 514381.

South Northants Computer Group meets at Anchor House, Moat Lane, Towcester, on Wednesdays at 7.30pm.

NOTTINGHAMSHIRE

Ashfield Computer Club meets at Carsic Junior School, St Mary's Road, Sutton in Ashfield on the first and third Thursday month. Derick Daines, c/o Cuttings Avenue, Sutton in Ashfield, Notts.

Eastwood Town Micro Computer Club meets at Devonshire Drive Junior School Wednesday at 5.45pm. Ted Ryan, 15 Queens Square, Eastwood, Nottingham NG16 3BJ.

Nottingham Microcomputer Club meets at Congregational Federation Centre, Castle Gate Centre, Nottingham, second Monday of each month at 7.30pm. Mr E Harvey, 68 Roseleigh Avenue, Nottingham NG3 6FH. Nottingham 608491.

Retford Computer Club meets bi-weekly at the Ivy Leaf Club, Retford, at 7.30pm.

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Contact John Lannigan on Retford 700134.
Worksop Computer Group. Mr Andrews, Worksop 487327.

NORFOLK

Anglia Computer User Group. Jan Rejzl, 128 Templemere, Sprowton Road, Norwich. 0603-29652.
Brecklands Computer Club. Contact Andrew Hiom, 11 Annafewes Close, Thetford, Norfolk. Meets each Saturday, 5pm at this address.
Dereham & District Computer Club. Meets at Middle School, Westfield Road, Tofftwood, East Dereham on every second Wednesday at 7.30pm. Contact Mrs Fran Cook, Dereh... ..7732.
East Anglian Computer User's Group meets at Crome Community Centre, Telegraph Lane, Norwich. Gill Rijzi, 88 St Benedicts, Norwich.
Gorleston Computer Club meets at Unit 26, Longs, Englands Lane, Gorleston, Great Yarmouth on Fridays at 6.30pm. Tel: 0493-6000003.
Yarmouth Computer Club meets each Friday at 7pm. Contact the club at Unit 26, Longs Estate, Englands Lane, Gorleston, Great Yarmouth, Norfolk, 0983 662871.

NORTHERN IRELAND

Belfast Computer Club meets 7pm on first Monday of each month at Ashby Institute, Stranmillis Road, Belfast 9. Contact Patrick Roddie on Holywood 3212.
North Down Micro Users Club. Meets at Bangor Central Library, Hamilton Road, every fourth Tuesday. Contact A Robson, 0247 67060.

OXFORDSHIRE

Association of Computer Clubs. Rupert Steele, St John's College, Oxford OX1 3JP.
Microsoc meets at Clarendon Lab, Parks Road, Oxford, every week during term. Rupert Steele, St John's College, Oxford OX1 3JP.
Oxford Personal Computer Club. Len Phelps, Southport Cottage, Sutton Courtenay, Nr Abingdon, Oxon OX14 4AU.
Ridgeway Computing Club meets at Swan Hotel, East Ilsley, on the second Tueday month. Mike Magney, Beavers, South Street, Blubury, Didcot, Oxon OX11 0JU.

SCOTLAND

Bishopton Computer Club meets at 'Cwa Ben', Sachelcourt Avenue, Bishopton, Renfrewshire, on Sunday once a month Alasdair Law, 10 Dunglass Road, Bishopton, Renfrewshire PA7 5EF.
Dundee — Kingsway Amateur Computer Club. Meets in rooms C11 & C12, Kingsway Technical College, Old Glamis Road, Dundee on Thursdays at 6.30pm. Contact J. Cook at the college on 0382 819021 or C. Macleod, 101 Peddie Sreet, Dundee.
Edinburgh Home Computing Club meets at Crosswinds Community Centre, Tollcross, Edinburgh, on the 2nd, 3rd and 4th Thursday of month from 7-10pm. I. Robertson, 031 441 2361.
Scottish Amateur Computer Society, Mike Anthony, 46 Moredun Park Gardens, Edinburgh EH17 7JR.
Central Scotland Computer Club meets at Falkirk College of Technology, Grangemouth Road, Falkirk, on the first and third Thursday of month. James Lyon, 78 Slamannan Road, Falkirk FK1 5NF.
Fife Computer Users Club meets fortnightly. Murray Simpson, 31 Tom Steward Lane, St Andrews, Fife, KY16 8YB.
Grampian Amateur Computer Society meets at 35 Thistle Lane, Aberdeen, on the second and fourth Monday every month at 7.30pm. Alan Morrison, 21 Beech Road, Westhill, Skene, Aberdeenshire AB3 6WR.
Kemnay Computer Club meets weekly. S Stubbs, 15 The Glebe, Kemnay, Inverurie, Aberdeenshire.
Inverness Personal Computing Club meets every second Tuesday at 7.30pm. Gyl Mackenzie, 38 Ardconnel Street, Inverness IV2 3EX, 0463 220922.
Perth & District Amateur Computer Society meets at Riverside Lounge, Bridgend, Perth, on the third Tuesday of month at 7.30pm. Alastair McPherson, 154 Oakbank Road, Perth PH1 1HA.
Skye and Lochalsh Computing Society. Contact C Manvell, Tigh na Pairc, 25 Lower Breakish, Isle of Skye IV42 8QA, 04712 317.
Strathclyde Computer Club meets at Wolfson Centre, 106 Rottenrow, Glasgow, on the third Wednesday of month. B Duffy, 24 Lomand Drive, Condorrat, Cumbernauld G4 8NW.

SHROPSHIRE

Ludlow & District Microcomputer Club meets at Diocesan Education Centre, Lower Galdeford, Ludlow, on the second Monday of month at 7.30pm.
Shrewsbury Micro Club meets at Shrewsbury Shirehall once a month. Mr V Ives, 6 Bramley Close, Severn Meadows, Shrewsbury SY1 2TP.
Telford Computer Club meets at Telford ITEC on Monday 6-9pm. John Murphy, 10 Brichmore, Brookside, Telford TF3 1TF. 0952 595959.

SOMERSET

Sharp MZ80 Club, Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset.
Taunton Computer Club, meets 6pm on Tuesdays during term time at Somerset College of Arts and Technology. Contact David Elliott at Fir Tree House, Back Lane, Westbury-sub-Mendip, Wells, Somerset.
Yeovil Computer Club. D G Carrington, 2 Romsey Road, Yeovil, BA21 5XN.

STAFFORDSHIRE

Alsager Computer Club, meets at Alsager Comprehensive School, Stoke-on-Trent, Staffs, fortnightly on Tuesday. Rex Charlesworth, 09363 77270.
North Staffs Amateur Computer Club meets on the third Wednesday of each month. J Roll, 16 Hill Street, Hednesford, Staffordshire WS12 5DS.
ICL Birmingham Branch Micro Club, c/o WBA Ecclestone, 26 Browns Lane, Tamworth, Staffs.
Tame Valley Computer Club, Tim Marshall, 32 Milton Avenue, Leyfields, Tamworth, Staffordshire B79 8JG.

SUFFOLK

Haverhill Microcomputer Club, meets at St Marys' Church Hall, Camps Road, Haverhill, on the second, third and fourth Wednesday of month at 7.30 to 10pm. Andrew Holliman, 5 Trinity Close, Balsham, CB1 6DW, 022 029 583.
Newmarket Home Computer Group. Meets at Anchor House, Moat Lane, Towcester, at 7.30pm. Contact Simon Clark, 83 Watling Street, Towcester, Northants NN12 7AG, 0327 52191.
Suffolk Microcomputer Club meets monthly. Mr S Pratt, c/o Microtek, 15 Lower Brook Street, Ipswich.

SURREY

Ashtead Computer Club meets on the last Thursday of month. Contact P Palmer, 8 Corfe Close, Ashtead.
Deaf Microcomputer Users Group. Contact Chris Marsh, 3 Delaporte Close, Epsom, Surrey KT17 4AF.
Thames Valley Amateur Computer Club meets at Griffon, Caversham, on the first Tuesday of month. Brian Quarm, 25 Roundway, Camberley, GU15 1NR, Camberley 22186.
Ewell Micro Club, Dave De Silva, 316 Kingston Road, Ewell, KT19 0SU.
Farnham Computer Club, meets at Farnham 6th Form College, Morley Road, Farnham, on the second Wednesday of month. Adam Sharp, 14 Thorn Road, Boundstone, Farnham.
West Surrey Computer Club meets at Paddock Room, Green Man Public House, Burpham, Guildford, the first Thursday of month. Chris Karney, 0483 68121.
ITN Computer Club meets on Fridays. A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, 0485 62035.
CBBS London meets on Sundays 4-10pm. P Goldman, PO Box 100a, Surbiton, KT5 8HY.
Richmond Computer Club meets at Richmond Community Centre, Sheen Road, on the second Monday of month at 8pm. Bob Forster, 18a The Barons St Margarets, Twickenham, Middlesex, 01-892 1873.
Sutton Library Computer Club meets at Central Library, St Nicholas Way, Surrey, on the first Friday of month and third Tuesday of month at 8.30pm. Dave Wilkins 01-642 3102.
Association of London Computer Clubs, Len Stuart, 89 Mayfair Avenue, Worcester Park, KT4 7SJ.

SUSSEX

Arun Microcomputer Club meets at Wick Amenity Centre, Wick Farm Road, Littlehampton, on the first Monday of month at 8pm, and third Sunday of month at 6pm. P Cherriman, 7 Talbot Road, Littlehampton, West Sussex DN17 7BL
Bognor Computer Club meets at RAFA club, Wateroll Square, Bognor Regis, West Sussex at 7.30pm on last Thursday of each month. BBC subgroup meets second Thursday. Contact Leo Hughes, 20 Pinehurst Park, Aldwick, West Sussex.
Brighton, Hove & District Computer Club. Meets 7.30pm every second Wednesday at Southwick Community Centre. Contact J Smith, 30 Leicester Villas, Hove, E Sussex.
Crowborough Computer Club meets first, second and fourth Tuesday of each month. Contact Bruce Piggott on 089 26 62970.
CVGC Video Games Club. Contact G Bond, 7 Swift Lane, Langley Green, Crawley Sussex.
Eastbourne & District Computer Club meets at 7.30pm on last Wednesday of each month at the WRVS Centre, Hyde Road, Eastbourne. Jim Booth, 0323 51437.
Horsham Microcomputer Club. Meets at the Forest Community School, Comptons Lane, Horsham on second Wednesday of each month from 7.30pm. Philip Dickinson 0403 60965 or Jim Laing 0403 67522.
Midhurst & District Computer User Group. Meets at the Grange Centre, Midhurst, at 7pm on the second and fourth Thursday of every month. Contact Val Weston, tel: Midhurst 3876.
Mid-Sussex Microcomputing Club. Contact Jeff Hayden, 2 Hillary Close, East Grinstead, RH19 3XQ.
West Sussex Microcomputer Club meets at Room R06, Robinson Road Annexe, Crawley, on the first and third Monday of month. J Clarke, 31 Hyde Heath Court, Pound Hill, Crawley, 0293-884207
Worthing & District Microcomputer Club meets at Rose Wilmot Youth Centre, Littlehampton Road, Worthing, on alternate Sundays 11am-1pm. B. Thomas, 11 Gannon Road, Worthing, W. Sussex, BN11 2DT, 0903 36785.

TYNE & WEAR

Newcastle upon Tyne Personal Computer Society meets at Room D103, Newcastle Polytechnic on the first Tuesday of every month. Pete Scargill, 21 Percy Park, Tynemouth, 0632 573905.

WALES

Abergele Computer Club meets at Abergele Cl Offices every Thursday at 7.30-10pm. W Jones, 77 Millbank Road, Rhyl, Clwyd.
Beddau & District Computer Club, meets at Beddau Community Centre, 7pm, Mondays. Nigel Butters, Newtown, Llantwit 206305.
Clwyd '80 Computer Club. Contact Allan Jones, The Island, 1 High Street, Connah's Quay, Deeside, Clwyd, 0244 816893. Meets at Deeside Community Centre, Queensferry, Deeside on Thursday at 7pm.
Colwyn Computer club meets at the Greens Hotel, Colwyn Bay, at 7pm. Contact D Bevan, c/o Abergele Road, Colwyn Bay, Clwyd LL29 7PA.
Gwent Amateur Computer Club meets at St Mary's Institute, Stow Hill, Thursday at 7.30pm. Rothery Harris, 16 Alanbrook Avenue, Newport, Gwent, Wales NPT 6QJ.
Llantwit Major Computer Club. Meets at Adult Education Centre, Llantwit Major, every Tuesday. Contact Douglas Mountain, 16 Denbigh Drive, Llantwit Major, South Glamorgan CF6 9GQ.
Mold Computer Club. Meets 7.30pm on first and third Thursday of each month at the Daniel Owen Centre, Earl Street, Mold. Contact G Johnson, 18 Daytona Drive, Northop Hall, Mold, Clwyd, Wales. Tel Deeside 821945.
Milford Central Computer Club. Open to schoolchildren, meets every lunch hour and evening. Contact Harry Evans, Milford Central School, Prioryville, Milford Haven, Dyfed, 043 784 571.
Newtown & District Computer Club meets first and third Friday of each month. Contact John Dale on 068 688 502.
Pencoed Amateur Computer Club meets fortnightly on Saturdays at Pencoed Welfare Hall. Philip Williams, 38 Bryn Rhedyn, Pencoed, Bridgend, Mid-Glamorgan CF35 6TL, 0656 860307.
Pontypool Computer Club meets at The Settlement, Roackhill Road, Pontypool, Gwent, on Friday. Graham Loveridge, on Pontypool 2827.
Swansea & Southwest Wales Amateur Computer Club meets on the last Friday every month. Paul Griffiths, 1 Prescelli Road, Penlan, Swansea SA5 8AF.
Swansea Computer Club. Meets at No 10 (pub), Union Street every Tuesday at 7.30pm. Contact Robert Palmer, 044 123 602.
Wrexham & District Computer Club. Meets each Thursday. Contact Mike Houghton, 1 Snerwell Avenue, Wrexham, Clwyd, Wales.

WARWICKSHIRE

Stratford Computer Club meets at the Wesley Hall, Stratford upon Avon, on the second Wednesday of each month at 7pm. Details from Chris Parry on 0789 68080.
Idiots' Computer Club. £1 gives you an elastic band and information sheet. This club is for morons only. Contact William Mitchell, Highmoor House, Green Lane, Welton, Lincolnshire.

WEST MIDLANDS

Cannock Computer Society meets at Cannock Computer Systems, Old Penkridge Road, Cannock, fortnightly. Terry Sale, 20 Redwood Drive, Chase Terrace, Walsall WS7 8AS.
Coventry Computer Circle. Contact Chris Baugh, 9 Hillman House, Smithford Way, Coventry CV1 1FZ.
Coventry Micro Club meets on Wednesdays at 7.30pm at Walsgrave Junior School. Jack Hewitt, 3a Boswell Drive, Walsgrave-on-Sowe, Coventry, Tel: 615543.
Walsall Computer Club meets at Park Hall Community School on the second and fourth Monday month 6.45-9.45pm. Alison Hunt, 58 Princes Avenue, Walsall, WS1 2DH, 0922 23875.
West Midlands Amateur Computer Club meets at Enfield School, Love Lane, Stourbridge, on the second and fourth Tuesday of month. John Tracey, 100 Booth Close, Brierley Hill, Kingswinford, 0384 70097.

WILTSHIRE

Chippenham and Calne, proposed new club. Matthew Jones, Pinhills, Calne SN11 0LY.
Chippenham Computer Club. Contact Peter Knaggs, 12 Seymore Road, Chippenham or call Chippenham 654940.

WORCESTER

Worcester & District Computer Club meets at Old Pheasant Inn, New Street, Worcester, on the second Monday month at 8pm. D Stanton, 55 Vauxhall Street, Rainbow Hill, WR3 8PA.

YORKSHIRE

Barnsley Co-Operative Computer User Group meets at Co-Op Social Club, Pogmore, Barnsley, on the last Tuesday month at 7.30pm. James Bridson, c/o 39 Kereforth Hall Road, Barnsley, South Yorks S70 6NF, 0226 41753.
Calderdale Computer Club meets on first Tuesday of each month. Contact Ray Franklin on 0279 815088.
Greenhead Grammar School Computer Club. Brian Smith, Greenhead Road, Keighley, West Yorks BD20 6EB, 0535 62828.
Huddersfield Computer Club meets every Monday. Chris Townsend, 760/4 Manchester Road, Linthwaite, Huddersfield, 0484 657299.
Keighley Computer Club. Meets each Wednesday at 7.30pm at Methodist Church Hall, Market Street, Keighley, West Yorks. Contact Simon Midgley on 0535 681463.
Leeds Microcomputer Users Group meets at 8 Regent Street, Chapel Allerton, fortnightly on Thursday at 6pm. David Parsons, 22 Victoria Walk, Horsforth LS18 4PL.
Program Power, R Simpson, 5 Wemsley Road, Leeds LS7 2BX, 0532 683186.
Shipley College Computer Group meets on Tuesdays. Paul Channell, tel: 0274 595731.
South Yorkshire Personal Computer Group meets at General Lecture Theatre, St Georges Building, Mappin Street, Sheffield, on second Wednesday month at 7.30pm. Paul Sanderson, 8 Vernon Road, Tetley, Sheffield S17 3QE.
Thurnscoe & District Micro Users' Club meets at Thurnscoe Comprehensive School, Physics Lab, Clayton Lane, Thurnscoe, Wednesday at 7.30pm during school term. Mr James Davis, 62 Tudor Street, Thurnscoe East, 0709 893880.
West Yorkshire Microcomputer Group meets on Tuesdays. Phillip Clark, c/o Suite 204, Crown House, Armley Road, Leeds LS12 2ES, 0532 632532.
York Computer Club meets at the Enterprise Club every Monday at 8pm. K Thomas, Green Lea, Ripon Road, Harrogate, HG1 2BY, 0904 38239.

If your association has something special on the agenda or if you've just started a new one, contact us at *Clubnet, Personal Computer News*, VNU, 62 Oxford Street, London W1A 2HG.

Clubnet keeps you in touch with enthusiasts throughout the country. It is divided into clubs and user groups and lists of both will be published every four weeks.

Beeb user group gets programming

Huddersfield's BBC User Group took off in mid-October when its first meeting drew an initial 12 people after a small advert was put in the local paper.

Organiser Stuart Mallinson said: 'During the first meeting we planned what we'd do in the future and found out what knowledge of computing members had, who specially in what, and the level of knowledge generally.'

The group discussed what stage of programming it was at and what it could do for the disabled in the area to help them learn to program. This looks like being the first actual project.

The second meeting in November drew 25 people.

Most members are adults, but three children, one of whom is disabled, also come along. 'It looks like the club will get very big,' said Mr Mallinson, 'We're hoping for about 60 people eventually.'

At the next meeting it will separate into four groups to learn programming.

The group has devised a questionnaire on things like newsletters, subscription charges and what people want to do with the group.

Wendie Pearson

Members watch a program running on the BBC.

Name Huddersfield BBC User Group **Venue** Church hall, Wooldale, Huddersfield **Meetings** Third Wednesday of each month, 7.30pm. **Contact** Stuart Mallinson 0484 685395.

USER GROUPS

Acorn

Coventry Acorn Atom User Group. Peter Frost, 18 Frankwell Drive, Coventry, 0203 613156.

Kent Medway Acorn User Group. Meets at St John Fisher School on last Monday of month at 7pm. Sessions at 9pm Thursday at the Fox and Hound, Chatham. Clem Rutter, c/o St John's Fisher School, Ordance Street, Chatham, Kent, 0634 42811 (day), 0634 373459 (evenings).

Manchester Acorn User Group. Meets at AMC, Crescent Road, Crupsall, Manchester 8 on Tuesday except school holidays. John Ashurst, 192 Vendure Close, Failsworth, Manchester, 061-681 4962.

Apple

Ashtead Apple User Group. Meets first Monday of every month. Contact M Lawrence, 15 Petters Road, Ashtead, Surrey.

British Apple Systems User Group, PO Box 174, Watford WD2 6NF.

British Apple Systems User Group. Meets first Tuesday evening and third Sunday afternoon every month at Old School, Branch Road, Park Street, St Albans. Subs: £12.50+£2.50 joining. Contact D Bolton, 0727 72917.

Birmingham & Region Apple Group. Contact Mel Golder, 021-426 2275.

Bristol Apple Users and Dabblers. Meets at 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, once a month. Ewa Dabkowski, c/o Datalink, 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, 0272 213427.

Buckinghamshire Apple User Group. Steve Profitt, The Granary, Hill Farm Road, Marlow Bottom, Buckinghamshire, 062 84 73074.

Chelmsford Apple Users Club. Proposed new club. Contact D Beckingham, 571 Galleywood Road, Chelmsford, tel: Chelmsford 66948.

Croydon Apple User Group. Meets at Sidda House, 350 Lower Addiscombe Road, Croydon, on second Monday of month. Paul Vernon, 60 Fawkhurst Way, West Wickham, Kent, 01-777 5478.

London Apple Music Synthesis Group. Dr Davis Ellis, 22 Lennox Gardens, London SW1.

South-East London Apple User Group (Appletree). Contact John Grieve at 106 Maran Way, Erith, Kent or phone 01-311 7681.

Milton Keynes Microcomputer User Group. Meets every Tuesday, 7.30pm. Brian Pain, Sir Frank Markham School, Woughton Centre, Chaffron Way, Milton Keynes.

Warrington Apple User Group. Meets at Horse & Jockey on first Monday of the month. Contact Jim Roscoe, Warrington 38101.

Atari

Birmingham User Group. Meets at the Malaga Grill, Matador Public House, Bull Ring shopping centre, Birmingham, on second and fourth Thursday every month at 7.30pm. Mike Aston, 42 Short Street, Wednesbury, West Midlands.

Carshalton Atari User Club. Paul Deegan, 01-642 5232.

Lea Valley Atari User Group. Meets every month. Details from Matthew Tydeman, 125 Cadmore Lane, Cheshunt, Herts.

South Cheshire Atari User Group. Meets at the Earl of Crewe, Nantwich Road, Crewe, on first Thursday of each month at 7.30pm. Contact A Davies, 48 Blagg Lane, Nantwich, Cheshire, 0270 626969.

Essex. Contact John Sarrar, 138 Frederick Road, Rainham, Essex, tel (76) 22077. Meets at Rainham Town Football Club, 7.30pm, second and fourth Friday of each month.

London Silica Atari 400/800 User Club. Richard Hawes, 01-301 1111.

Manchester Atari Computer Enthusiasts. Meets at The Ellesmere, Worsley Road, Worsley, on the second and last Thursday of every month. Contact Martin Davies, Bolton 700757.

Nottingham Atari User Group. Meets second and fourth Monday of each month at the Congregational Federation Centre, Castle Gate. Contact Richard Rose on Nottingham 623766.

South Middlesex Atari Club. Meets fortnightly, Tuesdays, at Staines Methodist Church Hall, Kingston Road, Staines. Contact Brian Milligan, 50 Linkscroft Avenue, Middelesex. Tel: Ashford (69) 45387.

Norwich Atari User Group. Ken Ward, Norwich 661149.

Preston Atari Computer Enthusiasts. Meets at KSC Club, Merrion House, Beach Grove, Ashton, Preston, on third Thursday of month at 7.30pm. Roger Taylor, 0253 738192.

UK Atari Computer Owners Club. Contact PO Box 3, Raleigh, Essex.

Atom

Liverpool BBC and Atom User Group. Meets at Old Swan Technical College, Room C33 on first Wednesday of month at 7.30pm and at Birkenhead Technical College on third Thursday of month at 7.30pm. Nick Kelly, 051-525 2934 (evenings).

BBC

Inverclyde BBC Micro User Group. Meets on third Monday of each month at 9 St John's Road, Gourock, Renfrewshire. Contact Robert Watt on Gourock 39967.

Laserbug is an international user group for the BBC micro. Paul Barbour, 10 Dawley Ride, Colnbrook, Slough, Berks, 02812 30614.

Beebug, Sheridan Williams or David Graham at PO Box 50, St Albans, Hertfordshire AL1 2AR.

Bolton BBC micro and Electron User Group. Meets in Room E5/15, Bolton Institute of Higher Education, Deane Road, Bolton, Lancs. Contact Chris Snee on 0942 720984.

Bournemouth BBC User Group. Meets at Lansdowne Computer Centre, 5 Holdenhurst Road, Bournemouth on first and fourth Wednesday of month at 7.30pm. Norman Carey, 0202 749612.

Brent/Barnet User Group. Meets on last Sunday of month. Joseph Fox, 4 Harman Close, London NW2 2EA.

Charlton & District (South Manchester) BBC Micro User Group. Contact Philip Harrison, 34 Holwood Drive, Manchester M16 8WS.

Chelmsug. Contact Ian on Chelmsford 69174.

Cardiff BBC Microcomputer Club. Meets alternate Wednesdays at Applied Science Lecture Theatre, University College, Newport Road, Cardiff.

Format 40/80 Club (BBC Disk User Group). Send SAE to Peter Hughes, Five Marsh Street, Bristol BS1 4AA.

Huddersfield BBC User Group meets third Wednesday of each month. Contact Stuart Mallinson on 0484 685395, eves. or write to 34 Ryefield, Scholes, Huddersfield, West Yorks.

Liverpool BBC & Atom Group. Meets on the first Wednesday of every month at Old Swan Technical College, Room C33, 7.30-9.30pm, and on the third Thursday at Birkenhead Tech. College, 7.30-9.30pm. Contact Nik Kelly, 56 Queens Drive, Walton, Liverpool L4 6SH.

North London BBC Micro Users Group. Meets at The Prince of Wales, 37 Fortune Green Road, on Tuesdays at 7pm. Dr Leo McLaughlin, Westfield College, University of London, Kidderpore Avenue, London NW3 7ST, 01-435 0109.

Northern North Sea User Group. Potential members with helicopters welcome. Contact Ian Wilkins on board MSV Stadive, Brent Field, East Shetland Basin, Northern North Sea (100 miles off Shetland Islands).

Nottingham BBC User Group meets on second Monday of each month. Contact John Day on 0602 225660.

Norwich & District BBC Microcomputer User Group. Meets at Norwich City College on the first and third Tuesday of every month at 7pm. Subs: £3; students and OAPs £1.50. Contact Paul Beverley, Department of Electronics, Norwich City College, Ipswich Road, Norwich NR2 2LJ.

Preston area BBC Micro User Group. Meets at Plough Hotel, Lea, Preston, on last Tuesday of month at 7.30pm. Duncan Coulter, 8 Briar Grove, Ingol, Preston, Lancashire, 0772 725793.

Tyne & Wear BBC User Club. Contact Ian Waugh, 13 Briardene Drive, Wardley, Tyne & Wear NE10 8AN.

Wakefield BBC Micro User Group. Meets at Holmfield House, Clarence Park, Wakefield, on first Wednesday of each month at 7.30pm. Contact R Bilton tel: Wakefield 382274.

Wellingborough BBC Owners User Group. Contact R Houghton, 49 Addington Road, Irthlingborough.

Witham (NAMEBUG) BBC Micro User Group. Meets at comprehensive school, Witham on second Thursday each month at 7.30pm. Dave Watts 0245 358127 after 7pm.

Basic

Welwyn Basic User Group meets at Campus West Library, Welwyn Garden City, Herts, on last Friday of each month at 7pm. Contact Debi Colthorpe, 36 Birds Close, Welwyn Garden City, Herts, 96 30082.

Colour Genie

International Colour Genie Users Group. Write with SAE to The Secretary, NCGUG, 46 Highbury Avenue, Bulwell, Nottingham, 0602 278791.

National Colour Genie User Group. Marc Leduc, 46 Highbury Avenue, Nottinghamshire NG6 9DB.

Comal

London Comal User Group. Meets at Polytechnic of North London, Holloway, second Wednesday of month, term time. John Collins, 75 74111.

CUA

CUA User Group. Adrian Waters, 9 Moss Lane Romford, Essex.

Commodore ICPUG

Basildon. Contact Walter Green, 151 The Hatherley, Basildon, Essex.

Bloxham. Contact John Temple, Kirabanda, Rose Bank, Bloxham, Oxon.

Barnsley. Bob Wool, 13 Ward Green, Barnsley, South Yorkshire, 0226 85084.

Blackpool. Meets at Arnold School, Blackpool, on third Thursday of month. David Jarrett, 197 Victoria Road, Thornton Cleveleys, Blackpool FY5 3ST.

Birmingham. Contact J A McKain, PPI Ltd, 177 Lozells Road, Birmingham, tel: 021-544 0202.

Bournemouth & Poole. Contact Douglas Shave, 97 Canford Cliffs Road, Poole, Dorset BH13 7EP.

Bury St Edmunds. Contact Alan Morris, 30 Kelso Road, Bury St Edmunds, Suffolk.

Burnley. Contact John Ingham, 72 Ardwick Street, Burnley, Lancashire.

Canterbury SE. Meets at The Physics Lab, Canterbury University, on first Tuesday and Wednesday of month. R Moseley,

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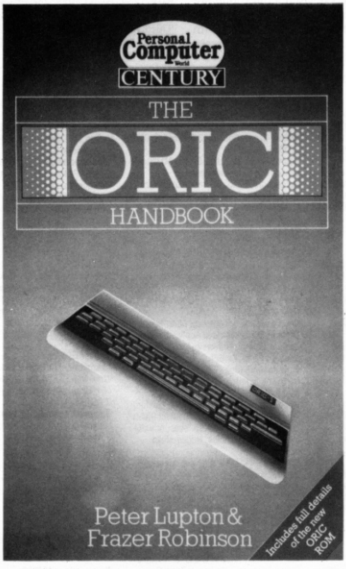

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Rosemount, Romney Hill, Maidstone, 0622 37643.

Carrickfergus. David Bolton, 19 Carrickburn Road, Carrickfergus, Antrim BT38 7ND, 09603 63788.

Chelmsford. Contact A G Surridge, 97 Shelley Road, Chelmsford, Essex.

Cheltenham. Meets at the Cheltenham Ladies College on last Thursday of month at 7.30pm. Alison Schofield, 78 Hesters Way Road, Cheltenham, Gloucester, 0242 580789.

Clwyd. John Poole, 6 Ridgway Close, Connah's Quay, Clwyd CH5 4LZ.

Corby. Peter Ashby, 215 Wincohn Way, Corby, Northamptonshire, 05363 4442.

Coventry. Meets at Stoke Park School and County College at 7pm on fourth Wednesday of month except July, August, December. Will Light, 22 Ivybridge Road, Stryechale, Coventry, Warwickshire.

Derby. Meets at Derby Professional Colour every other Tuesday at 7pm. Robert Watts, 03322 72569.

Derbyshire & District. Meets every other Monday 7-9pm at Davidson Richards Ltd, 14 Duffiied Road, Derby. Contact Raymond Davies, 105 Normanton Road, Derby DE1 2GG.

Devon. Contact Matthew Stibbe, The Lawn, Lower Woodfield Road, Torquay, Devon.

Durham. North-East Pet and ICPUG. Meets at Lawson School, Burniey at 7pm second and third Mondays. Jim Cocallis, 20 Worcester Road, Newton Hall Estate, Durham, 0385 67045.

Dyfed. Simon Kniveton, 097 086 303.

Gosport. Meets at Bury House, Bury Road, Gosport, Hants at 7pm. Contact Tony Cox, 10 Staplers Reach, Rowner, Gosport, Hants.

Hainault. Meets at Grange Remedial Centre, Woodman Path, Hainault. Carol Taylor, 101 Courtlands Avenue, Cranbrook, Ilford, Essex.

Glasgow. Dr Jim MacBrayne, 27 Daidmyre Crescent, Newton Mearns. Glasgow, 041-639 5696.

Gloucester and Bristol Area. Meets last Friday of each month. Contact Janet Rich: 20 Old Court, Spring Hill, Cam, Gloucester.

Gloucester North ICPUG user group meets last Thursday of each month. Contract R. C. Harvey on 0240 527588.

Hampshire. Meets at 70 Reading Road, Farnborough, on third Wednesday of month. Ron Geere, 109 York Road, Farnborough, Hants, 0252 542921.

Hants. Contact Tony Cooke, 7 Russell Way, Petersfield, Hampshire GU31 4LD.

Hertfordshire North. Meets at Provident Mutual Assurance, Purwell Lane, Hitchin, on last Wednesday of month. B Grainger, 73 Minehead Way, Stevenage, Herts SG1 2HS, 0438 727925.

Kilmarnock. Meets at Symington Primary School on first and third Thursday of month at 7pm. John Smith, 19 Brewlands Road, Symington, Kilmarnock KA1 5RW, 0563 830407.

Liverpool. Meets at The Merchant Taylor School for Boys, Crosby, on second Thursday of month at 7pm. Tony Bond, 27 Ince Road, Liverpool L23 4UE, 051-924 1505.

Llandyssul. Contact F Townsend, The Hill, Rhydowen, Llandyssul, 05455 5291.

London. Alan Birks, 135 Queen Alexandra Mansions, Judd Street, London WC1, 01-430 8025.

London North. Barry Miles, Department of Business Studies, North London Polytechnic, Holloway Road, London N7, 01-607 2789.

Maidstone. Meets on the first Wednesday of every month contact Ron Moseley, Lord Romney Hill, Weavering Maidstone, Kent, 0622 37643.

Mapperley. Meets at Arnold & Carlton College, Digby Avenue, Mapperley every Friday. Contact Mark Graves, 8 Digby Hall Drive, Gunthorpe Road, Gedling, Notts NG4 4JT.

Merseyside. Meets fortnightly. Contact P. Leather, 27 St Luke's Drive, Formby, Merseyside, tel: 36 74694.

National. Contact Membership Secretary, 30 Brancoates Road, Newbury Park, Ilford, Essex 1G23 7EP.

Norfolk. Proposed new club. Contact J Blair, 7 Beach Road, Cromer, Norfolk.

Norfolk. Peter Petts, Bramley Hale, Wretton, King's Lynn, Norfolk PE33 9QS, 0366 500692.

Northampton. Contact Peter Ashby, 215 Lincoln Way, Corby, Northants.

Northern Ireland. Meets last Wednesday of each month. Contact David Weddell, 9 Upper Cavehill Road, Belfast BT15 5EZ, 0232-711580.

Northumberland. Graham Saunders, 22 Front Street, Guide Post, Northumberland.

Nottingham Commodore User Group meets fourth Monday of each month — contact Christopher Solomon on Nottingham 873228.

Rhyl. Contact Frank Jones, 77 Millbank Road, Rhyl, Clywd, 0745 54820.

Slough. Meets at Slough College on second Thursday of month at 7.30pm. Brian Jones, 53 Beechwood Avenue, Woodley, Reading RG5 3DF, 0734 661494.

Somerset. Contact Paul Montague, 12 Laxton Close, Taunton, Somerset.

South-East. Regional Group. Meets at Charles Darwin School, Jail Lane, Biggin Hill, Kent, on third and fourth Thursday of month at 7.30pm. Jack Cohen, 30 Brancaster Road, Newbury Park, Ilford, Essex. 01-597 1229.

South Midlands. Meets at 12 York Street, Stourport-on-Severn on last Thursday of month. M J Merriman at above address.

Staffordshire. 57 Clough Hall Road, Kidsgrove, Stoke-on-Trent.

Stourport-on-Severn. Meets last Thursday of each month. Contact M Merriman, 12 York Street, Stourport.

Teddington. G Squibb, 108 Teddington Park Road, Teddington, Middlesex, 01-977 2346.

Watford. Meets on second Monday of month. Stephen Rabagtiati, c/o Institute of Grocery Dist. Grange Lane, Letchmore Heath, Watford, Herts, 01-779 7141.

Witney. Contact Ian Blyth, 40 Wilmot Close, Witney 5171.

Wolverhampton. Meets on first and third Thursday of each month. Contact J Bowman, 6 The Oval, Albrighton, Wolverhampton, W Midlands.

Commodore 64

National Commodore 64 Independent Users Club. Contact Clive Embrey, 17 Santon Ave, Fallowfield, Manchester or Keith Bowden, 47 Park Ave, Barking, Essex, enclosing SAE.

Commodore Pet

Blackpool. West Lancashire Pet Users Club. Meets at Arnold School, Blackpool on the third Thursday of month. D Jowett. 197 Victoria Road, East Thornton, Blackpool FY5 3ST.

Southern Users of Pets Association. Howard Pilgrim, 42 Compton Road, Brighton BN1 5AN.

Pet User Group Crawley. Richard Dyer, 33 Parham Road, Ifield, Crawley.

Pet Users Education Group. Dr Chris Smith, Department of Physiology, Queen Elizabeth College, Camden Hill Road, London W8 7AH.

UK Pet Users Club. 360 Euston Road, London NW1 3BL.

Pet Users Group. Meets at Polytechnic of North London, Eden Grove, Room 320. On alternate Tuesdays, 6pm. Barry Miles 01-607 2789.

Pet User Club. Margaret Gulliford, 818 Leigh Road, Slough Industrial Estate, 0753 74111.

Independent Pet Users Group. 57 Clough Hall Road, Kielsgrove, Stoke-on-Trent, Staffordshire.

Commodore Vic

National Association of Vic-20 Owners. Contact S Tomananek, 20 Milner Road, Sherwood, Nottingham.

Burnley. John Ingham, 72 Ardwick Street, Burnley, Lancashire.

Clwyd. Contact A Stanners, 192A Willow Park, Queensferry, Deeside, Clwyd, Wales, 816603.

London. Vic Users Group. Meets on alternate Tuesdays at 6.30pm at Polytechnic of North London, Community Centre. Robin Bradbeer.

London. Contact Jim Chambers, Department of Psychology, University College London, Gower Street, London, WC1, 01-387 7050 x 413. Meets at University College, 26 Bedford Way, London WC1, third Tuesday of each month at 8pm.

Norfolk. J Blair, 7 Beach Road, Cromer, Norfolk, 0263 512849.

Compucolour

Caversham. Compucolour Users Group UK. Meets at Community Centre, Caversham Park Village twice a year. Peter Hiner, 11 Pennycroft, Harpenden, Hertfordshire, 05827 64872.

CP/M

Chiltern CP/M User Group. Contact Kenneth Hirst, Welwyn Garden City 28723.

Irish CP/M Users Group. Meets monthly in Dublin area. Doug Notley, Gardner House, Ballsbridge, Dublin 4, Dublin 686411.

London. CP/M User Group (UK). Subs £7.50. Produces newsletter. Contact David Powys-Lybbe, 01-247 0691.

UK CP/M Users Group. Lesley Spicer, 11 Sun Street, London EC2M 2QD, 01-247 0691.

COSMAC

COSMAC Users Group. James Cunningham, 7 Harrowden Court, Harrowden Road, Luton, Bedfordshire, 0582 423934.

DAI

DAI UK User Group, Manchester. Contact Dave Atherton, 16 Douglas Street, Atherton, Manchester. Tel: 0942 876210.

d-BASE 11

UK d-Base 11 User Group. Contact Ian Turner at Ashton Tate (UK) Ltd, on 0908 568866.

Decus

Decus UK & Ireland. Contact Tracey Pardoe, DECUS, PO Box 53. Reading, Berks RG2 0TW.

Digital Equipment

Digital Equipment Users Society. The Secretary, PO Box 53, Reading, Berkshire, 0734 387725.

Dragon

Slough. Contact J Griffin, 1 Garrard Road, Britwell Estate, Slough. Tel: 75 35268.

Brixham Dragon Owners Club. Meets at Computer Systems (Torbay), Pump Street, Brixham, every Saturday at 2.30pm. Ian Chipperfield, 22 Brookdale Court, Brixham, Devon, Brixham 59224.

Greater Manchester. Contact Melvin Franklin, 40 Cowlees, Westhoughton, Bolton, Lancs.

Nottingham Dragon User Group. Meets second Monday of each month. Contact Mike Johnson on Nottingham 288541.

Ware Dragon User Group. Contact Paul Kennedy, 61 Broadmeads, Amwell End, Ware, Herts. Tel: Ware 68264.

Epson HX20

London. Contact Terence Ronson, 25 Sawyers Lawn, Drayton Bridge Road, Ealing, W13, 01-998 1494.

Luton. The Dragon's Den. Contact D Buckingham, 83 Neville Road, Limbury, Luton, Beds.

Education

Birmingham. Education ZX80/81 User Group. Eric Deeson, Highgate School, Balsall Heath Road, Highgate, Birmingham B12 9DS.

Birmingham. MUSE. National body for co-ordinating activity in schools, colleges. Lorraine Boyce, MUSE Information Office, Westhill College, Weoley Park Road, Birmingham, 021- 471 3723.

Dublin. Computer Education Society of Ireland. Dairmuid McCarthy, 7 St Kevins Park, Kilmacud, Blackrock, Co. Dublin.

Middlesex. Educational Users Group. Offshoot of National TRS-80 Users Group. Dave Fletcher, Head Teacher, Beaconsfield First and Middle School, Beaconsfield Road, Southall, Middlesex

Worcestershire. Mini and Microcomputer Users in Education. National organisation. R Trigger, 48 Chadcote Way, Catshill, Bromsgrove, Worcestershire B61 0JT.

Electron

Independent national user group for the Acorn Electron. Contact PO Box 50, St. Albans, Herts.

Forth

Forth Users Group. David Husband, 2 Gorleston Road, Branksome, Poole, Dorset BH12 1NW, 0202 764724.

Forth Interest Group UK. Meets at Room 408, South Bank Polytechnic London SE1 on the first Thursday of the month. Contact K Goldie-Morrison, Bradden Old Rectory, Towcester, Northants.

Forum

Forum 80 Users Group. Frederick Brown, 421 Endike Lane, Hull HU6 8AG.

FX-500P

FX-500-P Users Association. Max Francis, 38 Grymsdyke, Great Missenden, Buckinghamshire HP16 0LP.

Genealogists

Society of Genealogists Computer Interest Group. Anthony Camp. 01-373 7054.

Genie

Colour Genie User Group. Details of meetings/membership from Pat Doohan, secretary, Nottingham (0602) 278791.

Intel MDS

UK Intel MDS Users Group. Lewis Hard, c/o S.P.A.C.E., The Old Coach House, Court Row, Upton-on-Severn, Worcester WR8 0NS.

Ithaca Audio S100

Ithaca Audio S100 Users Group. Dave Weaver, 41 Dore Avenue, North Hykenham, Lincoln LN6 8LN.

Jupiter Ace

Jupiter Ace Users Group. John Noyce, Remsoft, 18 George Street, Brighton BN2 1RH.

Lynx

National Independent User-Group. Subs £9. Contact Robert Poat, 53 Kingswood Avenue, Sanderstead, South Croydon CR2 9DQ.

Mattel

Mattel Intellivision TV Game Group. Warrington 62215 after 4pm.

Medical

Durham. Primary Health Care Group. Dr Alastair Malcolm, British Computer Society, Cheveley Park Medical Centre, Belmont, Durham, 0385 64282.

London. Medical Micro Users Group. Medicom, 1-2 Hanover Street, London W1.

Middlesex. TRS-80 Medical and Laboratory Users. Dr Robinson, The Residency, Northwick Park Hospital, Harrow, Middlesex.

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Micronet
Micronet Independent User Group. Contact George Foot, Prestel Mailbox No. 892852867.

Nascom
Berkshire. Nascom Thames Valley User Group. Meets at Frogmore Hotel, Windsor, on Thursday fortnightly, 8pm. Mike Rothery, 37 Eaton Wick Road, Eton Wick, Windsor, Berkshire, Windsor 56106.
Birmingham Nascom User Group. Meets at Davenports Social Club, Granville Street, Birmingham on the last Thursday of month, 8pm. Martin Sidebotham, 021-744 3093.
International Nascom Microcomputer Club. 80 Oakfield Corner, Sycamore Road, Amersham, Buckinghamshire HP6 5EQ.
Merseyside Nascom User Group. Meets at Mona Hotel, St James Street, Liverpool, on the first Wednesday of month, 7.30pm. Mr T Searle, 051-526 5256.

Newbrain
Wakefield Independent Newbrain User Group. Anthony Hodge, 15 St John's Court, Wakefield WF1 2RY.
Welwyn. Contact Angela Watkiss, 4 Ninnings Lane, Rabley Heath, Welwyn, Herts AL6 9TD.

Ohio
Ohio Scientific User Group. Tom Graves, 19a West End, Street, Somerset, 0458 45359.

Oric
Avon. Contact Bob Green, 1 Mariborough Drive, Worle, Avon, tel: 0934 21315.
International Oric Owners' User Group. Send £1.00 plus SAE for details to R Green, 1 Malborough Drive, Worle, Avon or phone 0934 510279.
Oric Owners Group. Paul Kaufman, 3 Club Mews, Ely, Cambridgeshire.
Cardiff. 12 Tregarth Court, Creigiau, Cardiff.
Kent. Contact Roger Pyatt, 23 Arundel Drive, Orpington, Kent with SAE or call 66 20281.
West Lothian Oric User Group. Contact Stuart Wilson at 21 Loch Aweway, Whitburn, West Lothian EH47 0RJ with SAE, or phone 0501 42673 (eves).
Strathkelvin Oric 1 User Group. Contact Colin Failes on 041-776 3654, or SAE to him at 24 Muiriside Ave, Kirkintilloch, Glasgow G66 3PR.

Osborne
British Osborne Owners Group. J Anglesea, Flat 19, Rowan House, Mitton Road, Handsworth, Birmingham B20 2JR.

OSI
OSI UK User Group. Richard Elen, 12 Bennerley Road, London SW11 6DS.
OS-9 User Group. 1st Floor, 16 New North Parade, Huddersfield. Contact Mr. Ellis, Tel: 0484 516179 day or 0484 864130 after 6pm.

Pascal
Pascal User Group. Nick Hughes, PO Box 52, Pinner, Middlesex HA5 3FE.

PDP
Buckinghamshire. PDP8 User Group. Nigel Dunn, 21 Campion Road, Widmer End, High Wycombe, Buckinghamshire, 0494 714483.
Hertfordshire. PDP11 User Group. Pete Harris, 119 Carpenter Way, Potters Bar, Hertfordshire EN6 5QB, 0707 52091.

Pilot
UK Pilot User Group. Alec Wood, Wirral Grammar School for Boys, Cross Lane, Bebington, Wirral, Merseyside LG3 3AQ.

Prestel
ACC National Prestel Committee. Administrates Club Spot 800 (hobbyists on Prestel). Rupert Steele, St John's College, Oxford OX1 3JP.

Research Machines
Leamington Spa. West Midland RML User Group. Spencer Instone, c/o 59 Avenue Road, Leamington Spa.
Newcastle. NERML 380Z User Group. Meets monthly at Micro-Electronics Education Centre of the Polytechnic Coach Lane Campus. Mr Hatfield or Mr Reed, Computer Unit, Northumberland Building, Newcastle Polytechnic, 0632 326002.
Research Machines National User Group. Contact Jim Cooley, RMNUG, c/o Research Machines Ltd., PO Box 75, Oxford.
West Midlands RML User Group. Contact 0926 38751.

Sharp MZ80
Aberdeen. International Sharp Users Group. Graham Knight, c/o Knights Computers, 108 Rossemount Place, Aberdeen, 0224 630526.
Essex. Sharp MZ80K User Group. Joe Street, 16 Elmhurst Drive, Hornchurch, Essex RM11 1PE.
Leeds. Sharp PC1211 Users Club. Jonathan Dakeyne, 281 Lidgett Lane, Leeds LS17 3AQ.
Leeds, Sharp User Group. Postal only. Enquiries to Craig Kennett, 17 Moseley Wood Way, Cookridge, Leeds 16 7HN.
Somerset. Sharp MZ80 Users Club. Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset BA21 4AE.

Sinclair
Aylesbury. Sinclair ZX Computer Club. Ken Knight, 0296 5181.
Brighton. ZX Users Group. J Ireland-Hill Jnr, 145 Godwin Road, Hove, Brighton.
Colchester Sinclair User Group. Meets fortnightly. Richard Lawn, 102 Prettygate Road, Colchester, Essex.
Cardiff. ZX Club. Meets on last Sunday of month, 2pm. Mike Hayes, 54 Oakley Place, Grangetown, Cardiff, 0222 371732.
Folkestone. ZX Spectrum User Group for under 16s. Contact D. J. Parish, Brookhouse, Etchinghill, Folkestone; Kent.
Glasgow. ZX80/81 User Group. Ian Watt, 10 Greenwood Road, Clarkston, Glasgow, 041-638 1241.
Liverpool. ZX Computer Club. Meets each Wednesday at 7pm in the Youth Activities Centre. Contact Keith Archer on 051-236 6109.
London. National ZX User Club. Tim Hartnell, Interface, 44-48 Earls Court, London W8.
London. Sinclair User Group. Meets at Polytechnic of North London, Room 2-5 Tower Block. Monday, 5.30pm. Irving Brand, Polytechnic of North London, Holloway Road, London.
Manchester Sinclair Users Club. Meets at Longsight Library, 519 Stockport Road, Longsight, Manchester, every Wednesday at 7.30pm. Call 061-225 6997 or 061-445 6316.
Nottingham ZX Spectrum Club. D Beattie, 53 Kingsley Crescent, Sawley, Long Eaton, Nottingham NG10 3DA. Enclose SAE please.
Nottingham Sinclair User Group meets third Monday of each month. Contact Graham Basford on Nottingham 654522.
Scunthorpe. Grange Farm ZX Computer Club, Scunthorpe, South Humberside. Meets first and third Tuesday of month. Contact Sheila & Fred Wilkinson, 0724 842970.
Staffordshire. ZX80 National Software Association. 15 Woodlands Road, Wombourne, Staffordshire WV5 0JZ.
Suffolk. ZX Amateur Radio User Group. Paul Newsman, 3 Red House Lane, Leiston, Suffolk, SAE essential. No telephone inquiries.
Surrey. Guildford ZX80/81 Users Group. Meets Fridays. A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, 0483 62035.
Surrey. ZX80/81 User Club. David Bigden, PO Box 159, Kingston-upon-Thames, Surrey KT2 5UQ.
West Sussex. Hassocks ZX Micro User Club. Paul King, 25 Fir Tree Way, Hassocks, West Sussex.

Sirius
Sirius User Group. Ray D'Arcy, Sirius User Club, The Microsystems Centre, Enterprise House, 7-71 Gordon Street, Luton, 0582 412215.

68XX
68 User Group. Meets every fourth Tuesday throughout the year. Contact 41 Pebworth Road, Harrow, Middlesex.

6809 User Group
6809 User Group. Contact Mr Gibbons, 9 St. Thomas Hill, Launceston, Cornwall.

Software
London. Software Group. Meets at Polytechnic of North London, Room 2-3 Tower block Thursday, 6pm. Mike Duck at Polytechnic of North London, Holloway, London N7.
Oxford. Program of the Month Club. Mr Durrant, 55 St Thomas Street, Oxford OX1 1JG, 0855 250333.

Sorcerer
Liverpool European Sorcerer Club. Monthly meetings. Colin Marle, 32 Watchyard Avenue, Formby, near Liverpool L37 3JU, 07048 72137.
Surrey. Exidy Sorcerer User Group. Andy Marshall, 44 Arthurs Bridge Road, Woking, Surrey GU21 4NT.

Spreadsheet
International Electronic Spreadsheet Users Group. UK Alpha House, 7th Floor, Rowlandsway, Manchester M22 5RG.

Tandy
Tandy Model 100 User Group. SAE to Remsoft, 18 George Street, Brighton, tel: 0273 602354.

Tangerine
Avon. Tangerine Users Group. Bob Green, 1 Mariborough Drive, Worle, Avon, 0934 21315.
Bristol. Tangerine Homebrew. A Coales, 35 Mogg Street, St Werburghs, Bristol BS2 9UB.

Texas Instruments
Brighton. Contact Clive & Audrey Scally, 40 Barrhill, Patcham, Brighton, Sussex.
Ireland. Proposed new club. Contact Mrs Ann Flynn, 53 Georgian Close, North Road, Drogheda, Co. Louth, Eire.
Leeds. TI99/4A User Group. Meets at 30 Gipton Wood Road, Leeds 8, Mondays 7pm. I Youlden, 0532 401408.
Manchester. TI User Group. T Grimshaw, 21 Allingham Street, Longsight, Manchester.
Manchester. TI9900 User Group. Chris Cadogan, Department of Computer Science, University of Manchester M13 9PL.
Maidenhead — UK Texas Instruments User Group. Contact Katie Lomax, PO Box 190, Maidenhead, Berks, Tel: 0628 71696.
Nationwide TI Users Group. Contact TI99/4A Exchange, Independent TI Users, 40 Barrhill, Patcham, Brighton BN1 8UF.

Triton
Triton User Group. Nigel Stride, Transam Ltd, 12 Chapel Street, London NW1, 01-402 8137.

TRS-80
Birmingham. National TRS-80 User Group. Meets at Adam & Eve Pub, 1st Floor, Bradford Street, Birmingham on last Friday of month. Michael Gibbons, 1 New Street, Castle Bromwich, Birmingham B38 9AP, 021-747 2260.
Chelmsford. TRS-80 User Group. Michael Dean, 22 Roughtons, Galleywood, Chelmsford, Essex.
Durham. North East TRS-80 User Group. Meets at Information Technology Centre, Gateshead on the third Wednesday of month, 7pm. J Dunn, 8 Ettrich Terrace, North Gateshead, County Durham.
Edinburgh. Scottish TRS-80 and Genie User Group. Meets at Mansion House Hotel, Mitton Road, second Thursdays of month. Dick Mackie, 72 Morningside Drive, Edinburgh EH9 1DX, 031-447 6651.
Herts. Contact Reg Smith, 24 Sempill Road, Hemel Hempstead, Herts, 0442 60085.
Hull & District TRS-80/Beeb Users Group. Meets second Tuesday of month and Thursday 16 days later at Psychology Dpt, Hull University. Contact J Lawrence, 2a Hall Road, Hull HU6 8SA.
Isle of Wight. TRS-80 User Club. Meets at London Hotel, Ryde on last Friday of month. 7.30pm. Sean Coulson, 0903 614589.
Kent. TRS-80 User Group. Alan Reid, 22 Woodeys Road, Rainham, Kent, 0634 367012.
Greater Manchester. Northwest TRS-80 User Group. Meets at Barton Aero Club, Barton Aerodrome, Irlam, near Manchester on last Wednesday of month, 8pm. Melvin Franklin, 40 Cowlees, Westhoughton, Bolton, Lancs.
Lancs. TRS-80 Colour Computer Group. Subs: £3. Contact Ian Wild, 53 Darnton Road, Ashton-U-Lyne, Lancs OL6 6RL.
Liverpool. Merseyside TRS -80/Video Genie User Group. Meets second Thursday of month, 7.15pm. Peter Toothill, 101 Swanside Road, Liverpool L14 7NL. 051-220 9733.
London, SW. TRS-80 User Group. Ron Everitt on 01-394 2123.
Merseyside. TRS-80 User Group. N Rushton, 123 Roughwood Drive, Northwood, Kirby, Merseyside.
Milton Keynes. National TRS-80 and Genie User Group. Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes.
Nottingham. TRS-80 Genie Users Group. **Meets at Wilford Moderns Rugby Club House on first and third Wednesday every month at 7.30pm.** Contact Geoffrey Hillier, 5a Gregory Street, Lenton, Nottingham NG7 2LR, Nottingham 783938.
Nottingham. East Midlands TRS-80 User Group. Mike Costello, 15 Langbank Avenue, Rise Park, Nottingham NG5 5BU, 0602 751753.
London. TRS-80 Genie Group. Meets at Central Common Room, The Residency, Northwick Park Hospital on first Sunday of month. Dr Nick Robinson, Central Room, The Residency, Northwich Park Hospital.
Northants. TRS-80 User Group. Meets at Welwyn Park Community Centre on alternate Thursdays at 7pm. Neil Griffiths, 0858 65718.

UCSD
Hants. UCSD System Users Society. John Ash, Dicoll Data Systems Ltd, Bond Close, Kingsland Estate, Basingstoke, Hants RG2 0QB.
Oxford. UCSD Pascal UK Users Group. Malcolm Harper, Oxford University Computing Laboratory Programming Research Group, 45 Banbury Road, Oxford OX2 6PE.

Unix
Unix User Group UK can be contacted at Langley House, Langley Mill, Notts.

6502
Bedfordshire. 6502 User Group. Walter Wallenborn, 21 Argyll Avenue, Luton, Bedfordshire LU3 1EG, 0582 26927.
Hants. 6502 User Group (Southern Region). Steve Cole, 70 Sydney Road, Gosport, Hants.

Special thanks to the Association of Computer Clubs from whom clubnet was originally compiled in *PCN*'s early days.

PCN Billboard

ZX81 16K with over £100 of software, joystick with AGF interface, all boxed ZX magazines. Must sell £110ono, 500 2972 after 6pm.

Atari 822 thermal printer. Hardly used plus 2½ rolls thermal paper. £110. Selected cartridges £12.50 each. Pacman, Centipede, Jumbo-Jet, Submarine Commander, M. Command. Eves 01-674 5809.

Intellivision cassettes for sale, 16in all £8-£10 each, plus voicebox £25. £150 the lot inc Tron 1, Tron 2, B17 Bomber. 854 2579 after 6pm.

Tandy CGP 115 colour graphics plotter, as new, £110 ono. BBC dual disk drive, ten disks, formatter £315 the lot. These are amazing bargains. 01-289 0638.

Vic 20 plus transformer leads, manual. Boxed, as new, £75. Super expander £20, 16K expander £15. Dr Watson machine code monitor, £8. 01-310 1554.

Spectrum software, 50 arcade type games, including Pacman, Invaders, 3D Maze, Fruit Machine, Breakout etc., Send £5 to 92 Rushyrigg, Washington, Tyne'and Wear.

Apple II + compatible system 64K, numerical keypad, upper/lower case, manuals, software. Brand new. £450 ono. 0632 4104391 after 7pm.

Atari 400/800 cartridges wanted: Atariwriter £40 offered, Pole--Position, Pengo, Joust, Robotron, Computer War, Tennis. £15 each offered. Originals only plcase. 01-341 0464 eves.

Atari VCS as new condition, still boxed, 4 cartridges including Star Raider with Touch Pad and Phoenix. £100 ono Christmas bargain.

Vic 20 + cassette deck, Super Expander, games, introduction to Basic parts 1 and 2, Programmers Reference Guide, plus other goodies. £110 the lot. 08677 4582 (Oxford area).

Oric 1 48K computer still under guarantee. In original packing, complete with lead, manual, magazines £100. Broadstone (0202) 691953 after 6pm.

Anadex DP8000 dot-matrix printer and manual. 80 column, 112 CPS, tractor feed, 3K buffer, Centronics/RS232 interface. £100 including carriage. (0383) 729770.

Atari video computer system with games, Combat, Pac-Man, Space-Invaders, Golf surround, good condition, price £110. 01-254 9692 or 01-249 8640.

Philips G7000, (boxed as new) with 17 cartridges, including Munchkin, Satellite Attack, Golf, Computer Programmer and American Football. Just £200. 01-640 2531.

Expanded Atom 5V 3A PSU, books, magazines, joysticks, £50 software and tape deck. Offers invited. Contact Darren Taylor, 164 Warwick Road, Weston Estate, Macclesfield.

Sharp MZ80Z computer with expander I/F. Bargain at £400. As new condition. Buyer collects. 0773 872244.

Oric-1 48K, seven tapes including Trek., Mushroom Mania, Zodiac, plus books including Ian Singlair's. Good condition £100. 01-851 6261 after 6pm.

Commodore 64 + tape recorder + matrix, Hover Bovver, Hitch Hiker 64, and reference guide. Worth £285, quick sale £135 ono. (Ferndown) 897124.

Osborne 01 with software worth £800, Epson FX80 matrix printer, manuals, paper, disks, Wordstar, Supercalc, suit small business or writer. Allen 01-724 3681. £1,200 ono.

ZX81 complete with manual, all leads etc. Plus software with 21 programs including 12 games, as new, £20. Tel: 041-772 5827 after 6pm.

Spectrum 48K, cassette player, amp, M. Miner, Flight, Chess, VU 3D, Arcadia, Jet-Pac, 11 other programs, £110. Richard Harvey, 7 Brantwood Road, Newlands, Droitwich, Worcs, WR9 7RR.

Atari VCS in silver moulded vacuum tray with dust covers, keyboards, 12 cartridges including Phoenix, Defender, Missile Command, Astroids, Space Invaders. Tel: Yeovil 27621 for details.

Spectrum software (originals). 7 CRL titles, Manic Miner, Football Manager, Chuckie Egg, £25 the lot, or £3 each. Tel: Adam Whitlock 021-453 8876.

Spectrum 80K, printer cassette recorder, carrying case, software worth £40, books and magazines worth £25. Manuals and original boxes included. Still under guarantee, £190. Tel: 061-665 1886.

TRS-80 L2 16K, superb condition, £160+ of software. CCR-81 tape recorder, green screen monitor worth £500, all for £220. Tel: Littlewick Green (062882) 3476.

Spectrum games: Red Weed, Jaws Revenge, Cybotron, Wizard's Warriors, Mind-out, Horace Goes Skiing, Galaxions, Usurper, Derby Day, £4.00 or under. Tel: Longfield 4364 after 4.30.

Commodore 64 software 'Easy Script' word processing disk. Squash-A-Frog tape. Both unused, original boxes, £40 or separate. J Hardacre, 30 Teignmouth Road, Dawlish, Devon.

BBC games large selection of program power £2-£4 each. All hardly used, in mint condition, original packing. Tel: 01-889 7703.

ZX81 computer 16K RAM, printer, 5 cassettes, as new, £65 ono. Tel: Rotherham 546015 after 4.30pm.

I've boobed, needed more powerful machine, hence will swap new Sharp MZ700 with integral cassette, software and possible cash for BBC, offers. Tel: Crayford 522380.

TRS-80 L2 16K, all leads, BW TV, CTR-80A tape recorder, loads of software and books. Bargain offer of only £260 ono. Tel: (Watford) 31421.

Sharp MZ-80K 48K Extended Basic, Super copy, Frogger, Othello, Asteroids and other games, manuals and dust cover, excellent condition, £310 ono. Tel: Trowbridge (Wilts) 61144.

Commodore 64 four months old, boxed, plus C2N, Joystick, Programmer's, Guide, games (Matrix, Mutant Camels, Snooker, etc) total cost £340; wants £230. Tel: Nicholas 01-542 7952.

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TI 99/4A colour computer with joysticks, ROM cartridge, software, tape and aerial leads, nearly new, £130. Tel: Plymouth 707479 evenings.

Atari 400/800 ROM, games K-star Patrol, Super Breakout, and Missile Command, only £10 each, as new. Tel: 741 3361.

TI 99/4A joysticks, Parsec, Soccer, Connect Four, Speech Synthesiser + cassette software, £100 or swap for 16/48K Spectrum. A Trigg, 31 Clare Crescent, Baldock, Herts, SG7 6JR.

Atari VCS at a give-away price, £60, for Space Inv, Asteroids, Night Driver, Laser Blast, Combat and original box. Tel: Orpington 75989.

Spectrum 48K with printer, paper, software and books. Total cost new over £220 sell for, £110. Tel: (027581) 2029 (Bristol).

Spectrum software for sale. Inc Valhalla, Games Designer, Lunar Jetman, Chuckie Egg, over 30. Tel: 061-881 3651 (Tony).

Dragon 32, tape recorder, joysticks, software, magazines, £170, good condition, all boxed. Tel: Hounslow 572 9735. Ask for Dharminder. Ideal Xmas present.

Cumana 400K d/sided 80 track drive. Internal power supply, lead utilities disc + manual for BBC micro, £300. Tel: Lewes (07916 6935).

Sharp MZ80 A software and dustcover, as new, still in original box, £290. Tel: Fleetwood 76274.

BBC Model B boxed plus cassettes and recorded, leads manuals etc. £330 ono. Tel: Chris, Burgh Heath 61452.

Special offer: BBC software, Acorn soft, BBC soft, Gemini and bug-byte. Not £5 but £4. Tel: (01) 722-8745 4.30pm weekday, ask for David. Phone now!

Newbrain A tech manual and introduction tape. Screen monitor mint condition unused gift, £200. Tel: Harpenden 66304 after 6pm or weekends, offers considered.

Lynx 48K plus book, cassette games & NILUG membership. Conflicting hobbies force computer retirement. Yours for only £175. Tel: Dale Goodier, Kendal (0539) 28573.

Atari VCS plus joysticks and paddles, Demon Attack, Breakout, Riddle of the Sphinx, Street Racer, Combat, £80 ono. Tel: 0482 648023/633198.

Intellivision plus 7 cartridges £100 or will swop for or buy 48K, Spectrum, software bought separate, will pay up to £70. Tel: Matlock 2990.

Spectrum software for sale or swop, games include: Hobbit, Jet pan, Lunar, Jetman, Centipede, Pacman, Invaders, all very very cheap. Ring for lists, (0908) 762247.

Atari 400 48K typewriter keyboard, Atari programme recorder, joystick Basic cartridge, manuals and several games £195. Tel: Marlow 71331.

Atari 400 16K, program recorder, joystick, software includes: Gorf, Frogger, plus much more worth £300 + offers £100 or swap for Coleco Vision. Tel: (0324) 562051.

Apple II Europlus, 2 Apple drives, DOS 3.3; daisywheel printer, language card, clock card, Kaga monitor. Applewriter, visifile bookkeeper etc, manuals joysticks etc graphics tablet, £1450.00. Tel: 01-455 3608.

TI 99/4A, cassette lead, personal record keeping cartridge, home budget management cartridge, 3 game cassettes, Texas programme book, Texas magazines, £100. Tel: Portsmouth 694521 Tony Jackson.

Atari 400 16K, 410 program recorder, Basic and manuals, dust cover, 22 games, £160. 4 lane Scalextric, worth £300+ swop for Atari Compitable Printer or Spectrum. Tel: 01-659 4349.

Spectrum software for sale in original condition, Trader £4, Sworddfight £3, Pssst £3, Zzoom £3, Arcadia £3. Tel: Nottingham (0602) 231265 after 5pm.

Wanted Valforth language for the Atari 400/800, plus set of utilites and manuals, good price paid. Tel: Grant on (0309) 73694.

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Mispirnts and gobbledegook

The Great PCN Misprints and Gibberish Contest gets under way this week with a priceless offering from Christopher Mungall, of Newport-on-Tay, Fife. Christopher wins £5 for spotting this advertisement — the world's most powerful ZX81?

If you come across anything like it, send it in to PCN at Evelyn House, 62 Oxford St, London W1, and we'll award a fiver for any we print.

ZX81 plus power supply, manual 16 ft ram pack and 2 game tapes, £40. Bennett, 7 Wellington Square, Dundee.

NEXT WEEK

Junior *PCN opens the new year with a full Pro-Test of IBM's new baby.*

Electroguide *The Micropaedia pull-out section takes you through Acorn's Electron.*

3-piece suite *We look at an assembler/editor/monitor package for the Spectrum.*

Wise owl *How to smarten up your Wordwise.*

Oric Extra *We pick up the tabs.*

Games *Reviews of software for the Dragon, Commodore 64, Spectrum and Colour Genie.*

Plus *all PCN's regular features*

SYNTAX ERRORS

Atari

Allrian, mentioned in Monitor, Issue 39 as a newcomer to the Atari field has asked us very politely to point out that it was the first Atari software supplier in the UK, apart from Atari itself.

Dragon owners . . .

Sharp-eyed Dragon owners reading the Dragon 64 review (Issue 39) would have noticed from the illustration of the Dragon's board on page 23 that we enhanced the 64 (and by implication, the 32) with RGB. The extra display option is actually composite video, not RGB.

Newbrain fixes

The Newbrain word processor is still not functioning fully, despite our inclusion of the errant subroutine last week. There are two reasons for this — first, a number of lines went missing in PCN's production process, and second, the inclusion of a number of lines for use in future expansions. However, if you add the lines below, your word processor should work:

```
1163 sp$(3)="****": REM y, m,
     escapeCHR1$ (161), CHR$
     (150), CHR$ (67)
1164 tr$(1)="remrem"
1165 tr$(2)="endendend"
1166 tr$(3)="endend"
1167 en$=tr$(2)
1299 REM OPEN PAGES
1300 GOSUB 9000
9299 REM PRINT INDEX
9300 PUThm: FORa=1TOss:
     PUTb1:?pg$(a):
     NEXTa:?1n$:RET
22999 REM FUTURE
     EXPANSION
23300 RET
```

There were also three misprints in the third part of the series. On page 26 of issue 39, line 2 should read 2 CHR$(148): GRAPHICS/t. The second line of text on page 27 should read Sp$(2)="HXYZ[*]©—^0B5C". Note that there should be no space after the square brackets. Further down, line 2 should read 2 CHR$(150): GRAPHICS/v.

PCN DATELINES

PCN Datelines keeps you in touch with up-coming events. Make sure you enter them in your diary.

Organisers who would like details of coming events included in PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

UK EVENTS

Event	Dates	Venue	Organisers
Which Computer? Show	January 17-20	NEC, Birmingham	Clapp & Poliak Europe Ltd., 01-747 3131
Northern Home Entertainment Show	January 19-22	Excelsior Hotel, Manchester Airport	Stamley Wire Advertising Ltd., 01-253 6637
Acorn Education Exhibition	January 25-27	Central Hall, Westminster	Computer Marketplace (Exhibitions) Ltd, 01-930 1612
Peripherals Suppliers	January 31-February 2	Cunard International	Reed Exhibitions, 01-643 8040
Communications & Computer Systems Fair — CABLES	February 2-4	Pontin's, Prestatyn, Wales	Pontin's Ltd., 07456 2267
London Home Computer Show	February 3-5	Royal Horticultural Society's Old Hall, Westminster, SW1	Andy Jones, 0562 751126
10th ZX Microfair	February 4	Alexandra Palace, N22	Mike Johnstone, 801 9172
The Apricot & Sirius Show	February 7-9	Kensington & Chelsea Town Hall	Dennis Jarrett, 241 2448
Taunton YMCA Computer Exhibition	February 11	Taunton YMCA, Somerset	P. Wojeik, 0823 74667
LET '84	February 13-15	Heathrow Penta Hotel	Anthony Farrar, 0923 774262
International Home Computers, Video Games & Software Exhibition	February 13-15	Heathrow Penta	Wheatland Journals Ltd., 0923 774262
Information Technology & Office Automation Exhibition and Conference	February 21-24	Barbican Centre, London EC1	B.E.D. Exhibitions Ltd., 01-647 1001
OEM Only Conference	March 7	Hilton Hotel, London W1	Tom Lewis, 01-994 6477
Computer Trade Show	March 13-15	Wembley Conference Centre, Middlesex	Reed Exhibitions, 01-643 8040

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
International Winter Consumer Electronics Show 22-25	January 6-10	Las Vegas, USA	Consumer Electronics Shows, Chicago, 0101 312 861 1040
National Software Show (East)	February 3-5	Miami Beach, Florida, USA	Raging Bull, USA, 0101 415 459063
Personal Business Computer Show	February 29-March 3	Hong Kong	Overseas Exhibition Services Ltd., 01-486 1951

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▼	3 (1)	Jet Pac	Ultimate	Spectru
▶	4 (4)	Zoom	Imagine	Spectru
▲	5 (8)	Hobbit	Melbourne	Spectru
▼	6 (5)	Penetrator	Melbourne	Spectru
▼	7 (10)	Harrier Attack	Martech/Durell	Oric

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